

NEW WORLD FULGORIDAE, PART I: GENERA WITH ELONGATE HEAD PROCESSES

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ABSTRACT.—Genera new to science described below include: *Amerzauna*, *Sinuata*, and *Stalubra*. New species include: *Amerzauna peruana* (Peru), *Amycle brevis* (Mexico), *A. grandis* (Mexico), *A. mankisi* (Honduras), *Aphrodisias shaman* (Mexico), *Enchophora maculata* and *E. uniformis* (Peru), *Phrictus delicatus* (Brazil), *P. diligens* (Colombia), *Sinuata schmidti* (Belize), *S. stali* (Honduras and El Salvador), *S. tuberculata* (Costa Rica), and *Stalubra brunnea* (Brazil and Guyana). In addition, *Artacie dufourii* (Signoret) is removed from synonymy with *A. haemoptera* (Perty). New generic synonymy includes *Chilobia* Stål (= *Ecuadoria*) Distant, *Enhydria* (Walker) (= *Ulubra* Stål). New synonymy of species includes: *Copidocephala merula* Distant (= *Coanaco melanoptera* Schmidt), *Copidocephala viridiguttata* Stål (= *Coanaco ornanda* Distant), *Diareusa conspersa* Schmidt (= *D. dahli* Ossiannilsson), *Enchophora nigromaculata* Distant (= *E. nigrolimbata* Lallemand), *Enchophora recurva* (Olivier) (= *E. bohemani* Stål), *Enchophora sanguinea* Distant (= *E. florens* Distant and *E. longirostris* Distant), *Enchophora tuberculata* (Olivier) (= *E. parvipennis* Walker), *Enchophora viridipennis* Spinola (= *E. eminenta* Schmidt), *Enhydria tessellata* (Walker) (= *E. brachialis* Stål), *Fulgora graciliceps* Blanchard (= *Laternaria orthocephala* Fonseca), *Fulgora laternaria* (Linnaeus) (= *F. servillei* Spinola), *Phrictus auromaculatus* Distant (= *P. notatus* Lallemand), *Phrictus moebiusi* Schmidt (= *P. sordidus* Caldwell). The two species of *Fulgora* are synonymized by Ridout. New combinations include *Chilobia dichopteroides* (Distant) (*Ecuadoria*) and *Stalubra rufula* (Lallemand) (*Enhydria*).

Although the genera of New World Fulgoridae were monographed in an excellent paper by Stål (1870b), 25 of the 64 genera have been described since then. Also, there have been many subsequent species described, many in the wrong genus, and there are few keys to species. Consequently, even though they are large and beautiful insects, it is very difficult to identify most species. The purpose of this paper is to provide a guide for identification with emphasis on the use of external characters.

Very little is known about the biology of Fulgoridae. Two species have been reported to be of economic importance (Wilson and O'Brien 1987), *Phrictus diadema* (L.) on cocoa trees (*Theobroma cacao* L.) in Brazil (Silva 1945) and *Pyrops candelaria* (L.) on longan and mango (Kershaw and Kirkaldy 1910). Host records for species contained in this paper include *Amycle pinyonae* Knull & Knull on pinyon pine, *Pinus monophylla* Voss (Knull and Knull 1947), *Fulgora laternaria* (L.) on *Hymenaea courbaril* L. or quapinol (Janzen 1983), *Enchophora pallidipunctata* Lallemand on *Copaifera dourajeaui* (Leguminosae) (label data, species not found in botanical references), and *Rhabdocephala brunnea*

Van Duzee on *Baccharis sarothroides* Gray. Johnson and Foster (1986) explored host specificity in a tropical forest, where plant diversity might make host finding difficult, and found 71% of *Enchophora longirostris* Distant (= *sanguinea* Distant) on *Simarouba amara* Aubl. (Sapindales) and 84% of *Phrictus quinquepartitus* Distant on *Terminalia oblonga* Steud. (Combretaceae). Adults have been reported to aggregate on tree trunks in ranks and to move in conjunction with each other (Johnson and Foster 1986, O'Brien and Wilson, 1985). Further host data will be given in parts to be published later.

Little information on life histories is available. Kershaw and Kirkaldy (1910) noted that the eggs of *Pyrops candelaria* were laid in flat clumps on tree trunks and covered with wax from the female abdominal segments; nymphs dispersed and fed on branches; and adults fed on tree trunks. Hingston (1932) reported rearing fulgorid nymphs from what he described as a mantidlike egg case. Other descriptions of immatures are those of *Fulgora phosphorea* L. (= *laternaria* L.) (Hagmann 1928); *Pristiopsis serratus* (F.) (= *Cathedra serrata* [F.]) (da Fonseca 1931), and *Itzalana submaculata* Schmidt (Wilson and O'Brien 1986). As far as

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is known, fulgorids feed in phloem tissue and are univoltine. No accounts of other typical fulgoroid behaviors, such as acoustical communication and association with ants, have been reported.

Fulgoridae are subject to predation by flycatchers (D. Wechsler, personal communication) and parasitization by the epipyropid moths (Lepidoptera, Epipyropidae). The colors of the closed wings would appear to make them inconspicuous against tree trunks, but they can be found fairly easily by the human eye if observed in profile. I assume that the red, orange, yellow, and white coloration so common at the base of the hind wings is similar in function to that of the underwing moths (Noctuidae), in which the color has been shown to startle birds seeking prey. Eye spots on the hind wings of *Cathedra* and *Fulgora* would seem to serve a startle or warning function as well. But for all the speculation on the bizarre shapes of the head processes, no one has reported the response of predators to the "alligator head" of the peanut bug, nor to any other species.

One common name for the family Fulgoridae, "lantern-flies," was given because *Fulgora* were reported to emit light (de Merian 1771), but recent inquiries and enzyme studies have failed to substantiate this phenomenon (Ridout 1983). Many Amerindians feared *Fulgora*, reporting that they flew a zigzag path through the forest, killing everything they touched (Branner 1885). Shamans carried one in their amulet bags. The modern version of this myth, probably invented and surely repeated in coed entomology classes far out in the bush, is that if a human is bitten by a *Fulgora*, death is certain unless one is saved by the antidote, mating within 24 hours; nonsense, of course.

Lallemand (1959, 1963) revised the 20 genera and 102 species of Fulgoridae from Africa and the 28 genera and 178 species of Asia and Australia. The New World has a much richer fauna, composed of 64 genera and 250 species as I begin this monograph. The only revisions of New World genera in which authors examined types are *Cyrpoptus* (Kramer 1978) and *Fulgora* (Ridout, personal communication). Other generic reviews are those on *Fulgora* (da Fonseca 1932), *Enchophora* (Metcalf 1938), *Phrictus* (Caldwell 1945), and *Poicocera* (Gerstaecker 1860), which are either out of

date or relied on published descriptions. I have examined types of all but the following species: *Artacie dufourii* (Signoret) (MZFP?, letter not answered); *A. haemoptera* (Perty) (ZSBS, not found); *Cathedra serrata* (Fabricius) (not listed by Zimsen 1964); *Copidocedphala melanoptera* Schmidt, *Diareusa conspersa* Schmidt, and *Enchophora eminenta* Schmidt (IZW); *Enchophora ensifera* (Germar) and *E. tuba* (Germar) (lost in Lvov, Russia); *E. nigrolimbata* Lallemand and *Enhydria rufula* Lallemand (FSAG, sent but not yet arrived); Olivier's species, *E. recurva*, *E. tuberculata*, and *F. caerulea*, and the types of *Fulgora*, which were studied by Ridout. Olivier's (1791) species were redescriptions with Latin binomials of Stoll's (1781, 1788) descriptions and figures in French and Dutch or Flemish, using names in those languages. Olivier's species are not in the Paris Museum (MHNP), nor in his personal collection deposited there, which is all Coleoptera (Bourgoin, personal communication). Olivier cites "Du cabinet de M. Holthuisen" in some species; Horn and Kahle (1935) say of Holthuisen collection "in Hamburg am 3.II.1796 u. 16.V.1797 sowie in Stralsund 1800 verauktionert." If any specimens went to the Hamburg Museum (ZMUH), they were destroyed by bombing in World War II, except for a few specimens out on loan. I have not been able to trace Olivier's or Stoll's specimens further. The first three of the species listed here were well illustrated when described; Schmidt's descriptions clearly fit the specimens I have; only Lallemand's, Germar's, and Olivier's species are in doubt.

Fulgoridae may be distinguished from other Fulgoroidea by the presence of numerous cross-veins in the hind wings, a feature lacking in all other families. Stål also noted that the carina between the frons and gena continues onto the clypeus, but this feature also occurs in some Derbidae, Dictyopharidae, and Lophopidae. Fulgoridae share with the Dictyopharidae similar bilaterally symmetrical, usually trilobed, inflatable male genitalia. Emelyanov (1979) transferred some Asian genera from Dictyopharidae to Fulgoridae, citing other characters, but these characters are not diagnostic for New World families.

The stable characters easiest to use are color, especially of the hind wing; the shape

and length of the head process when present; and the shape and carinae of the frons, vertex, and thorax. Since the proportion of the head length to the body length varies greatly with the genera and cannot be determined from the illustrations, measurements are given for the genera (unless it is impossible to get an accurate measurement because of the variability of the curvature of the head process as in *Enchophora*). The ratio of head/pronotum is given for most species. Male genitalia are difficult to inflate consistently, but they are figured for some specimens; I state when I believe they must be used for a valid determination, such as in *Scolopsella*. These descriptions are brief and diagnostic; illustrations are more helpful than words. A character matrix is being prepared and will be published when all of the genera have been studied.

Part I covers those genera with head processes. These keys are artificial. When the definition of genera and placement of species is completed, an attempt will be made to produce cladograms and to identify monophyletic taxa. Two species are consigned to incertae sedis. I do not recognize the genus of *Enchophora ensifera* (Germar) among any New World Fulgoridae or Dictyopharidae, nor *Fulgora caerulescens* Olivier as figured by Stoll (1788, plate 13, Fig. 65) among any New World Fulgoridae or Flatidae.

Illustrations of the characters used are found in Figures 1–10 and 33. Three words that may not be commonly used elsewhere are defined as follows: *fossette*—a small, deep pit; *porrect*—extending forward horizontally; *terete*—round in cross section. The head process may have 10 carinae or fewer, which are named in Figure 4. The median vein is pectinate in Figure 5. The convention in Fulgoroidea is to consider the “base” of the insect the dorsal junction between head and thorax, with the base of the head and pronotum both here. The ventral part of the head has its base anterad, at the junction with the vertex, and its apex at the frontoclypeal suture, which is the base of the clypeus.

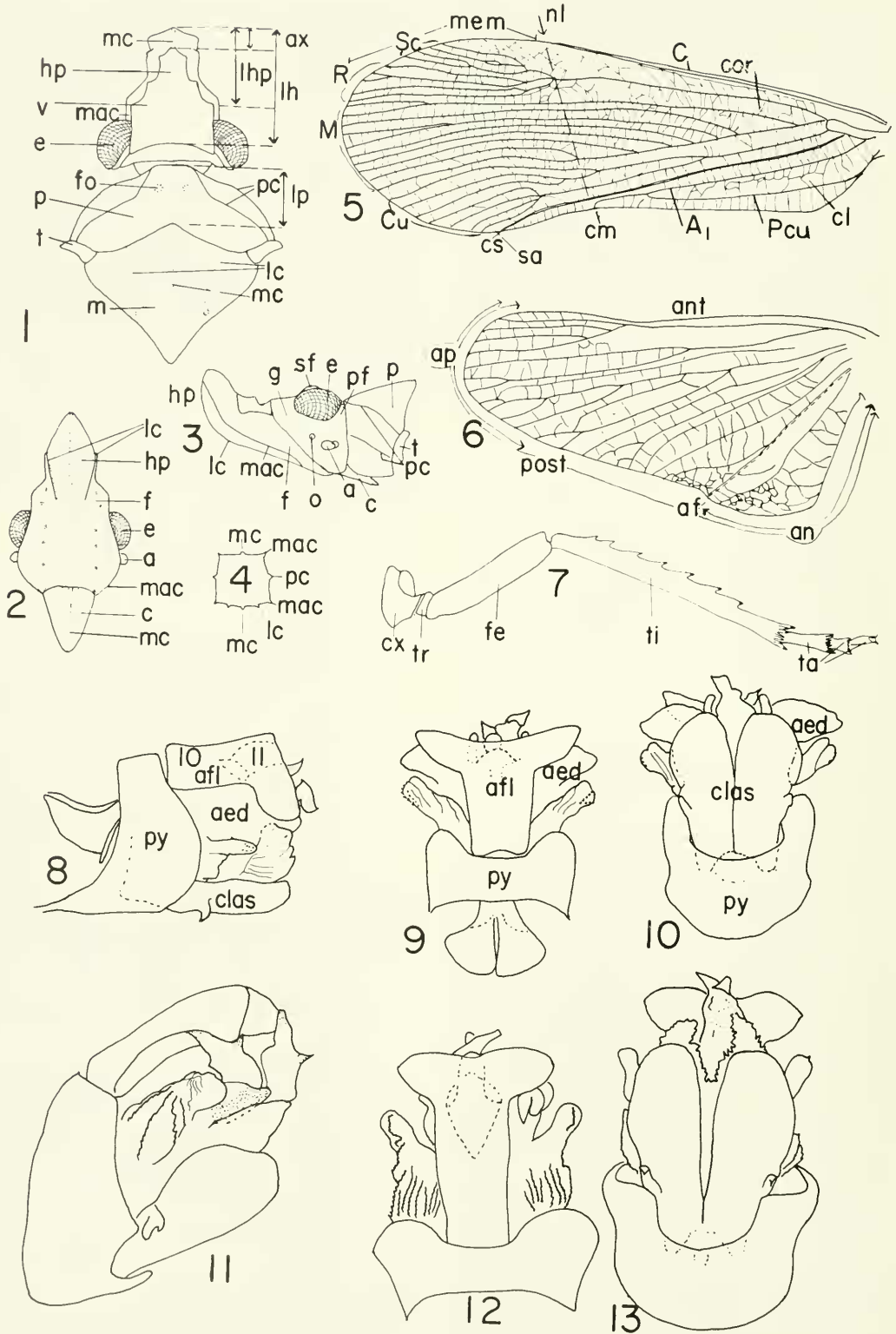
To save duplication in each section, I have included within the final part of this paper the literature cited for all parts (although papers published subsequent to Metcalf's catalog are cited here); a list of localities with provinces or longitude and latitude (only the city or distance for a city plus elevation where given will

be included earlier), and lectotypes or neotypes will be designated. There is a list of genera and species and their distribution by country at the end of this part. Type repository abbreviations are listed in the acknowledgments.

To complete this monograph successfully, I will need help in locating specimens, since many species are known from uniques or one sex only, and distribution records are incredibly incomplete. For at least a year after the publication of this article, I will accept specimens for identification for the traditional recompense, a sample of the specimens in return for identification. Perhaps your specimens will become types. The genus *Chilobia* is a case in point: there are four described species, I have 10 new ones on hand, and only one species is known from more than one specimen. Please help if you have unidentified specimens.

Key to Genera of New World Fulgoridae
with Head Processes

- 1. Tegmen usually transparent, rarely opaque in basal half 2
- Tegmen opaque, rarely transparent at apex 4
- 2(1). Tegmen transparent brown with small bristles on veins; prothorax with small, white nodules *Enhydria*
- Tegmen without bristles on veins; prothorax without small, white nodules 3
- 3(2). Vertex longer than broad (Fig. 1) *Stalubra*
- Vertex 3 times as broad as long in midline, emarginate medially (Figs. 51, 54, 60) or apex of vertex hidden by recurved head process (Fig. 57) *Chilobia*
- 4(1). Each hind wing with an eyespot visible from below with wings unspread; head process gibbous or laterally serrate with narrow apex; large species, over 50 mm in length 5
- Hind wings without large, round eyespots; head process porrect or curved, but not as above 6
- 5(4). Head process peanut-shaped, in lateral view with markings mimicking an alligator head; eyespot on hind wing with iris or pupil *Fulgora*
- Head process subtriangular, narrowing at apex, strongly serrate (Fig. 26); eyespot on hind wing without iris or pupil *Cathedra*
- 6(4). Head process porrect (Figs. 14–32, 46–50, 102–117) 9
- Head process curved up and back (Figs. 33–35, 40–42, 63–76) 7
- 7(6). Preocular horizontal flange between eye and junction of frons and vertex; head process adpressed to vertex, flattened, rugosely tuberculate (Figs. 33–35) *Artacie*



Figs. 1-13. See facing page for identification.

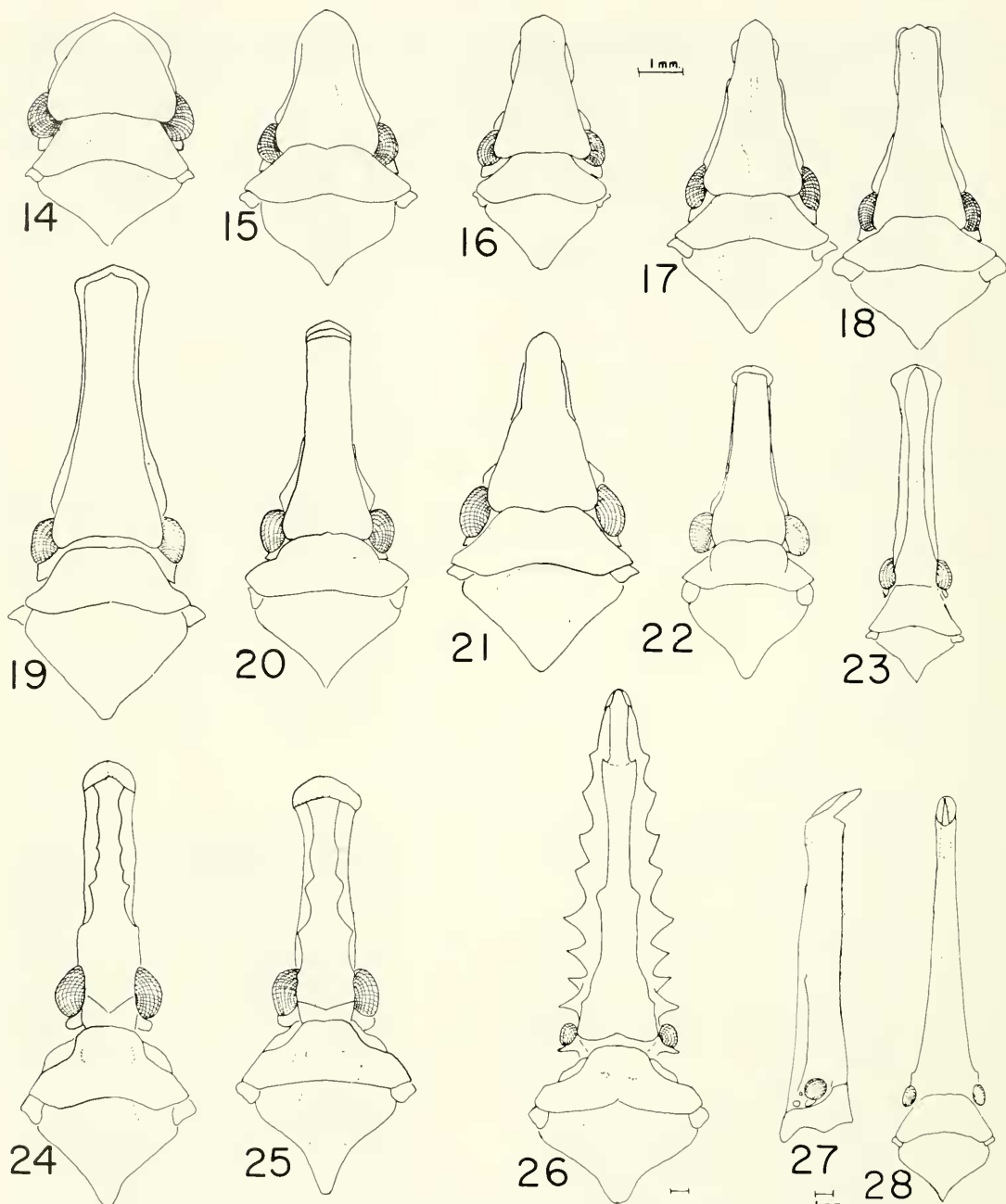
Figs. 1-13. 1-3, 5, 6: *Stalubra brevis* O'Brien: 1, dorsal view, head and thorax; 2, frons and clypeus; 3, lateral view, head; 5, tegmen; 6, hind wing. Hypothetical insect: 4, diagrammatic cross section of head process showing position of carinae; 7, stylized hind tibia. Male genitalia, lateral, dorsal, and ventral views: 8-10, *Scolopsella mexicana* O'Brien; 11-13, *Scolopsella reticulata* Ball.

Morphological characters:

- a-antenna
- A₁-1st anal vein
- aed-aedeagus
- af-anal fold of hind wing
- af1-anal flap (10th and 11th abdominal segments)
- an-anal area
- ant-anterior margin of wing
- ap-apical area of hind wing
- ax-apex
- b-base
- C-costa or costal vein
- c-clypeus
- cl-clavus
- clas-clasper
- cm-commissural margin
- cor-corium
- cs-claval suture
- CU-cubitus or cubital vein
- cx-coxa
- e-eye
- f-frons
- fe-femur
- fo-fossette
- g-gena
- hp-head process
- lc-lateral carina
- lh-length of head
- lhp-length of head process
- lp-length of pronotum
- M-media, medial vein
- m-mesonotum
- mac-marginal carina
- mc-median carina
- mem-membrane of tegmen
- nl-nodal line
- o-ocellus
- p-pronotum
- pc-pleural carina
- Pcu-postcubital vein
- pf-postocular flange
- post-posterior area of wing
- pr-pronotum
- prf-preocular flange (see Fig. 33)
- py-pygofer
- R-radius, radial vein
- sa-sutural angle
- Sc-subcostal vein
- sf-supraocular flange
- t-tegula
- ta-tarsoneres
- ti-tibia
- tr-trochanters
- vertex of head

(Continued from page 137)

- Preocular horizontal flange absent; head process usually not adpressed to vertex (see *E. tuberculata*, *subviridis*, *pyrrhocrypta*, Figs. 67, 73, 75) 8
- 8(7). Pronotal median carina raised, with deep fossettes at base; mesonotal apex depressed, striate (Figs. 63-76) *Enchophora*
- Pro- and mesonota smooth and gently rounded (Figs. 40-42) *Copidocephala*
- 9(6). Medium-sized species, 26-50 mm in length 10
- Small species, under 25 mm in length 13
- 10(9). Head process with apex twice as wide as narrowest part, dorsolateral edges of process with spines *Phrictus*
- Head process with apex not so widened, sides of process without spines 11
- 11(10). Sutural angle of tegmen triangularly produced; head with small, horizontal, preocular flange (Figs. 116-117) *Odontoptera*
- Sutural angle of tegmen rounded; head with slight vertical flange on vertical carina (Figs. 27-32) 12
- 12(11). Head process elongate, head 1/3 length of insect, subtriangular, slightly bent dorsad at apex; hind wing clear with veins tinged with green at base, brown elsewhere *Amerzanna*
- Head process proportionally shorter, less than 1/5 length of insect, with sides subparallel, apex slightly enlarged, not bent dorsad; hind wing brown with either red or white spots *Diareusa*
- 13(9). Head process semicircular in cross section; with dorsal surface slightly compressed, ventral rounded *Amycle*
- Head process more nearly rectangular or circular in cross section 14
- 14(13). Head, including process, longer than thorax; tegmen with major veins straight 15
- Head, including process, shorter than thorax; tegmen with major veins irregular, slightly angulate 16
- 15(14). Head process subrectangular in cross section, carinae foliaceous, angulate (Figs. 24, 25) *Scolopsella*
- Head process smoothly rounded, almost circular in cross section, carinae normal (Fig. 23) *Rhabdocephala*
- 16(14). Costal margin of tegmen markedly sinuate (Fig. 43); head process not transversely striate *Sinuala*
- Costal margin of tegmen slightly convex; head process transversely striate (Fig. 49) *Aphrodisias*



Figs. 14-28. Head and thorax, dorsal view: 14, *Amycle brevis* O'Brien; 15, *A. pinyonae* Knull & Knull; 16, *A. saxatilis* Van Duzee; 17, *A. tumacacoriae* Knull & Knull; 18, *A. vernalis* Manee; 19, *A. grandis* O'Brien; 20, *A. sodalis* Stål; 21, *A. mankinsi* O'Brien; 22, *A. amabilis* (Westwood); 23, *Rhabdocephala brunnea* Van Duzee; 24, *Scolopsella mexicana* O'Brien; 25, *S. reticulata* Ball; 26, *Cathedra serrata* (Fabricius); 27, 28, *Amerzanna peruana* O'Brien (27, lateral view).

Amerzanna, n. gen.
Figs. 27, 28

Type-species: *Amerzanna peruana* O'Brien.

Medium-sized, narrow, brown insects, 31-41 mm long, head 1/3 length of insect.

Head process porrect, terete, gradually narrowed to apex; apex bent upward; dorsal and ventral median and lateral carinae present on anterior third; weak but traceable pleural carina curving ventrally to end in slight

ventral tubercle. Preocular flange absent. Pronotum smoothly rounded, traces of fosses and pleural carinae faintly visible. Tegmen with M pectinate; cross-veins irregular, forming diamond-shaped cells. Profemur longer than metafemur, posterior tibia with 6 lateral spines. Ninth abdominal tergite in females twice as long as eighth.

I name this genus *Amerzanna* because superficially it resembles the genus *Zanna* from Africa and Asia. The type-species is *A. peruana*, new species. *Amerzanna* differs from *Odontoptera*, which has the head similarly shaped, by the differences in the tegmina, for it lacks the sharp sutural angle and the spot on the nodal line of *Odontoptera*.

Amerzanna peruana, n. sp.

Figs. 27, 28

LENGTH.—Male 31–33 mm, female 35–41 mm; head 15.6 mm; ratio, head/pronotum 8.3.

Ground color reddish brown. Tegmina well pigmented, transparent, but not obviously so (the hind wings may be seen through the tegmina). Hind wings transparent, greenish cloud at base, brown cloud at apex, brown veins between.

HOLOTYPE (male) and ALLOTYPE (female).—PERU: Madre de Dios: Rio Tambopata Res., 30 air km SW Pto. Maldonada, 290 m, 16–20-XI-1979, J. B. Heppner, subtropical, moist forest (USNM). Paratypes (10 female, 1 male): 3, same data (USNM); 2, 11–15-XI-1979 (USNM); 2 females, 1 male 6–10-XI-1979 (USNM, LOB); 2, Loreto, Ucayali R. Yarina Cocha, 30-XI-1954, leg. Peter Hocking, 1 head process broken (LOB, FMNH); 1, Yahuar Mayo, Apc. Group (MCZ).

Amycle Stål

Figs. 14–22, 93–101

Amycle Stål 1861:148. Type species: *A. amabilis* (Westwood), subsequent designation by Van Duzee 1916:78

Cyrpoptus (*Amycle*) [sic] Stål, 1862:305.

Small, brown insects, 12–23 mm long, head 1/8 to 1/4 length of insect. Head process porrect, dorsoventrally flattened, dorsal surface flat, ventral convex; usually elongate triangular, but sometimes parallel-sided, sometimes slightly enlarged at apex; dorsal lateral carinae sinuate, it and other carinae variable between species. Preocular flange horizontal, about as

produced as marginal carinae. Tegmen with M not pectinate (2 main branches), cross-veins reticulate, apical margin more angulate than in most genera. Metatibia with 4–5 lateral spines (sometimes 3 or 7 on a single tibia). Female ninth tergite 1.5–2 times as long as eighth.

This genus may be separated from other small, brown fulgorids by the porrect head being flattened dorsoventrally. It resembles *Cyrpoptus* in wing coloration. Diagnoses are not provided; these species may be identified by the shape of the head (Figs. 14–22) and the color and color pattern of the hind wings (Figs. 93–101).

Key to the Species of *Amycle*

1. Hind wing with 2 colors, brown posterior and base white, yellow, pink, or red (Fig. 93) *saxatilis* Van Duzee
- Hind wing with 3 colors, brown posterior, translucent area (Figs. 94–101), and base white, yellow, orange, or red 2
- 2(1). Base of hind wing yellow, white, or pink 3
- Base of hind wing red or orange 4
- 3(2). Base of hind wing yellow or yellow-orange, contiguous with brown suffusion, apical area lightly suffused with brown, intermediate area translucent (Fig. 101) *amabilis* (Westwood)
- Base of hind wing pale pink, contiguous with white band, posterior margin brown (Fig. 97); sides of head process parallel (Fig. 18) *vernalis* Manee
- 4(2). Vertex at least twice as long as broad (Figs. 17–21) 5
- Vertex less than twice as long as broad (Figs. 14, 15) 8
- 5(4). Hind wing with brown apical and anal areas contiguous (Figs. 93–97) 6
- Hind wing with transparent area between brown apical and anal areas (Figs. 98–100) 7
- 6(5). Hind wing with transparent area restricted to narrow anterior band (Fig. 94); head process parallel-sided (Fig. 20) *sodalis* Stål
- Hind wing with transparent area about 1/4 area of wing (Fig. 95); head process subtriangular (Fig. 21) *mankinsi*, n. sp.
- 7(5). Head process expanded at tip (Fig. 19); hind wing with red area separated from brown anal and apical areas by transparent band (Fig. 98) *grandis*, n. sp.
- Head process subtriangular (Fig. 17); red area and brown anal area contiguous (Fig. 100) *tumacacoriae* Knull & Knull
- 8(4). Head broader than long (Fig. 14); apex of hind wing narrowly brown (Fig. 99) *brevis*, n. sp.
- Head longer than broad (Fig. 15); apex of hind

wing broadly brown (Fig. 96)
 *pinyonae* Knull & Knull

Amycle amabilis (Westwood)

Figs. 22, 101

Fulgora amabilis Westwood 1842:119. Type repository: UMO.

Amycle amabilis (Westwood), Stål 1861: 148.

LENGTH.—Male 14 mm; head 3.4 mm, ratio, head/pronotum 3.1.

Head process elongate, parallel-sided. Hind wing yellow to yellow-orange at base, followed by brown suffusion, apical area less darkly suffused, area between latter two hyaline.

DISTRIBUTION.—Holotype and paratype: MEXICO. No other specimens seen.

Amycle brevis, n. sp.

Figs. 14, 99

LENGTH.—Male 13 mm, female 14 mm; head 1.8 mm; ratio, head/pronotum 1.0.

Head triangular, not produced into distinct process (Fig. 14). Hind wing pale orange at base, anal area pale brown, dark brown area on each side of anal fold, apical row of cells brown (Fig. 79). Tegmina in male pale orange with brown maculation apically; in female mottled brown throughout, forming a pattern with a clean, apical, diagonal line.

The two specimens upon which this species is based may represent different species, but the head and hind wings are similar; examination of male genitalia will be necessary to determine whether these are two different species. *A. brevis* may be separated from other species by its short head.

HOLOTYPE (male).—MEXICO: Nayarit, San Blas, 4-IX-1971, W. J. Hansen (LOB). Female (not allotype or paratype): Guerrero: Ciudad Altamirano 20-X-1983, H. Brailovsky, E. Barrera (LOB).

Amycle grandis, n. sp.

Figs. 19, 45, 98

LENGTH.—Female 20–22 mm; head 5 mm; ratio, head/pronotum 4.5.

Head elongate, slightly expanded at apex (Fig. 19). Hind wing orange in basal 1/3, brown in anal 1/3 and apical 1/4, translucent areas between (Fig. 98). Tegmina brown with most veins orange-red; two diagonal, brown lines delineating translucent half oval on costa, translucent triangle at apical angle, and

mottled brown and white pattern in anal angle (Fig. 45).

HOLOTYPE (female).—MEXICO: Sinaloa, Mazatlan, 5-VIII-1971, D. W. Davis (LOB). Paratype (female): Sonora, Canyon Sapopa, 15-X-1934, Rio Mayo, H. S. Gentry (CIS). Possible male (not paratype): Jalisco, Chapala, 6 mi W Jalisco, 30-VI-1963, J. Doyen (LOB).

Amycle mankinsi, n. sp.

Figs. 21, 95

LENGTH.—Female 17 mm; head 3.5 mm; ratio, head/pronotum 2.9.

Head slightly elongate triangular, turned up at apex (Fig. 21). Hind wing red in basal third, apical and anal thirds brown, all colored areas separated from each other by pale areas (Fig. 95). Tegmen brown with most veins red.

I dedicate this species to Dr. J. V. Mankins, with whom we have spent many happy hours collecting.

HOLOTYPE (female).—HONDURAS: Lago Yojoa, 2-IX-1977, J. V. Mankins (LOB). Female paratype: same data except 6-X-1977 (LOB).

Amycle pinyonae Knull & Knull

Figs. 15, 96

Amycle pinyonae Knull & Knull 1947:397. Type repository: OSU.

LENGTH.—Male 8 mm, female 14–14.5 mm; head 2.6 mm, ratio of head/pronotum 1.9.

Head process triangular, lateral margins sinuate. Hind wing reddish orange in basal 2/5, anal and apical angles brown, translucent area between with brown veins. Tegmen dark brown with many clear areas, these not forming definite pattern.

DISTRIBUTION.—Holotype (male): CALIFORNIA: Pinyon Flat, Santa Rosa Mts. on *Pinus cembroides* var. *monophylla* Voss. I have seen three other specimens collected in August from CALIFORNIA: Pinyon Flats and Valvermo and NEW MEXICO: Juan Tabo, 7,000 ft.

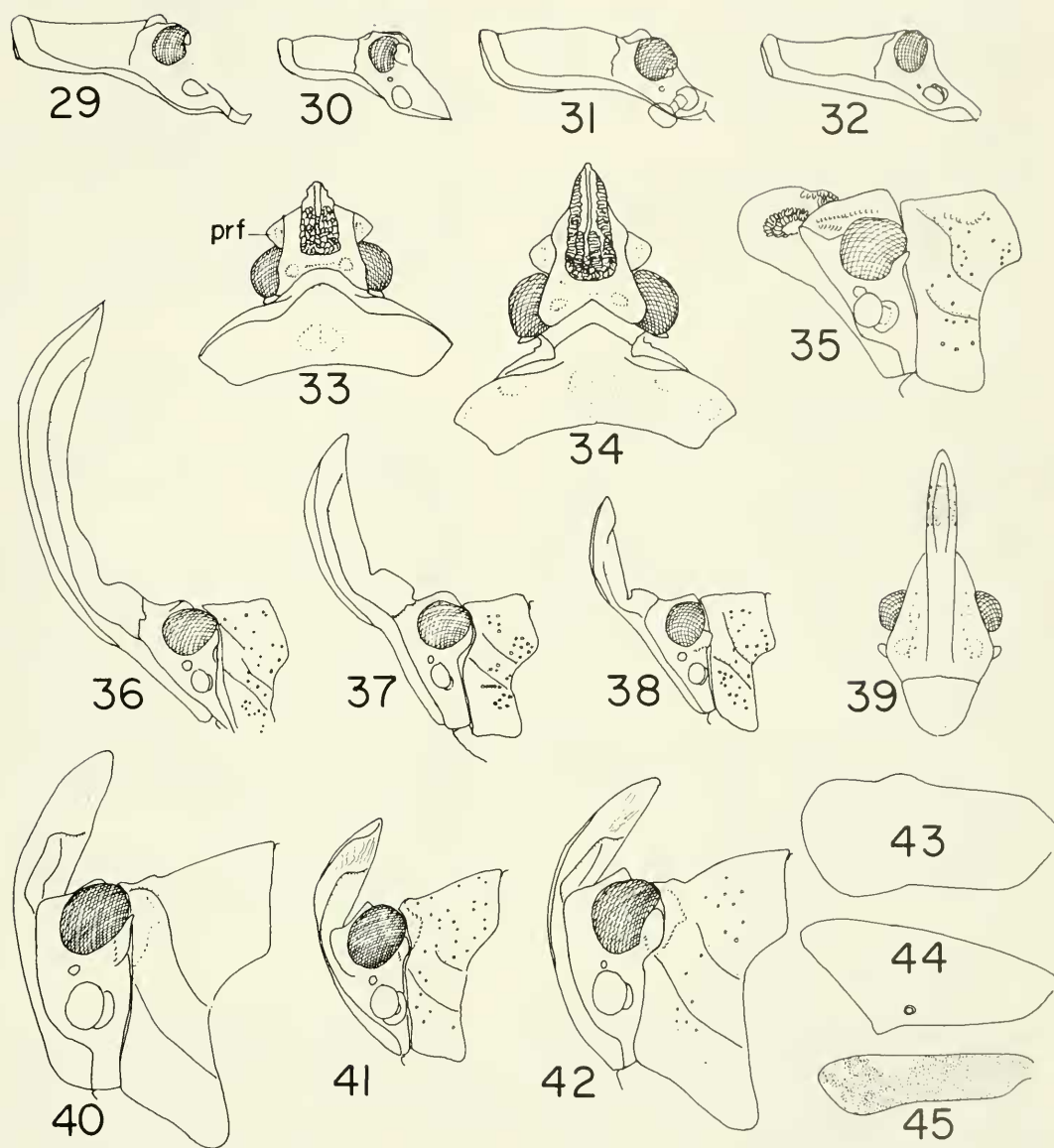
Amycle saxatilis Van Duzee

Figs. 16, 93

Amycle saxatilis Van Duzee 1914:33. Type repository: CAS.

LENGTH.—Male lectotype 12.5 mm; head 2.8 mm, ratio, head/pronotum 3.5.

Head process elongate triangular. Hind wing pale orange at base, followed by white



Figs. 29–45. Head, lateral view: 29, *Diareusa conspersa* Schmidt; 30, *D. kemneri* Ossiannilsson; 31, *D. annularis* (Olivier); 32, *D. imitatrix* Ossiannilsson. Dorsal view: 33, *Artacie haemoptera* (Perty); 34, *A. dufouri* (Signoret). Lateral view; 35, *A. dufouri* (Signoret) (pronotal nodules shown only in lateral view); 36, *Enhydria longicornuta* Lallemand; 37, *E. tessellata* (Walker); 38, *E. cicadina* Gerstaecker. Frontal view: 39, *E. cicadina* Gerstaecker. Lateral view: 40, *Copidocephala merula* Distant (nodules not shown); 41, *C. viridiguttata* Stål; 42, *C. guttata* White. Tegmen: 43, *Sinuala tuberculata* O'Brien; 44, *Odontopectera carrenoi* Signoret; 45, *Amycle grandis* O'Brien.

band, posterior half light brown. Tegmen pale, only slightly darker at apex.

Van Duzee said the color at the base of the hind wing varied from red to luteus in his specimens. This has been verified (N. Penny, personal communication). The color pattern, however, in both specimens has no translucent area.

DISTRIBUTION.—Lectotype, right wing removed and pinned beneath specimen: CALIFORNIA: San Diego County. I have seen no other specimens.

Amycle sodalis Stål
Figs. 20, 94

Amycle sodalis Stål 1861:148. Type repository: NRS.

LENGTH.—Male 13–14 mm, female 16.5–18 mm; head 4.5 mm, ratio, head/pronotum 4.5.

Head process elongate, sides parallel to apex. Hind wing orange at base, dark brown posteriorly, anterior 1 1/2 rows of cells behind orange base translucent (Fig. 94). Tegmina red basally, apically translucent with 2 dark apical lines (similar to *Cyropoptus*); some dark patches caudally.

DISTRIBUTION.—Holotype: MEXICO. I have seen six other specimens collected from July through November from EL SALVADOR: Santa Tecla, 900 m and MEXICO: Atlixco, Canada de Negros, Cordoba, Huachinango.

Amycle tumacacorae Knull & Knull
Figs. 17, 100

Amycle tumacacorae Knull & Knull 1947:398. Type repository: OSU.

LENGTH.—Male 14 mm, female 14–15.5 mm; head 3.7 mm; ratio, head/pronotum 3.7.

Head process elongate triangular, slightly widened just before apex, slightly bent dorsad in lateral view. Hind wing red-orange at basal third, dark anal and apical areas, gray membranous areas between with dark veins. Tegmen dark brown with few translucent apical cells. This species is very close to *A. vernalis* in shape and length of head process; it differs in the color and pattern in the hind wing.

DISTRIBUTION.—Holotype (male): ARIZONA: Tumacacori Mts. I have seen 12 other specimens from ARIZONA: Catalina Mts., Chiricahua National Monument, Molino Basin, and Pepper Sauce Canyon; TEXAS: Eastland County, Forestburg, 31 mi W Ozone, Tyler.

Amycle vernalis Manee
Figs. 18, 97

Amycle[sic] vernalis Manee 1910:117. Type repository: USNM.

LENGTH.—Female 14.5 mm; head 4 mm; ratio, head/pronotum 4.0.

Head elongate, sides gradually narrowing to apex, apex slightly turned up. Hind wing pale pink in basal fourth, followed by band of white, posteriorly black.

DISTRIBUTION.—Lectotype: NORTH CAROLINA: Southern Pines (USNM). I have seen one other specimen from LOUISIANA: Galbraith.

Aphrodisias Kirkaldy
Figs. 49, 50

Compsoptera Stål 1869:236. Type species *C. cacica* Stål, original designation.

Aphrodisias Kirkaldy 1906:248, new name for *Compsoptera* Stål.

Small, reddish brown insects, 18–23 mm long, head about 1/8 length of insect. Head process porrect, terete, transversely striate on all sides; dorsolateral carinae present; short, nonstriate, apical portion with dorsal median carina and longitudinal ridge on vertical face. Preocular flange horizontal. Tegmina with longitudinal veins irregularly angled, not straight; few cross-veins. Female ninth tergite slightly longer than eighth.

This genus may be separated from all other genera by the wrinkled, porrect head process. The head process of *Artacie* also is textured, but it is recurved and recumbent on the vertex.

Key to the Species of *Aphrodisias*

- 1. Head with wrinkled or striate portion of process shorter than pronotum; hind wings red at base, brown apically *cacica* (Stål)
- Head with wrinkled portion of process longer than pronotum; hind wing red, white, and brown *shaman*, n. sp.

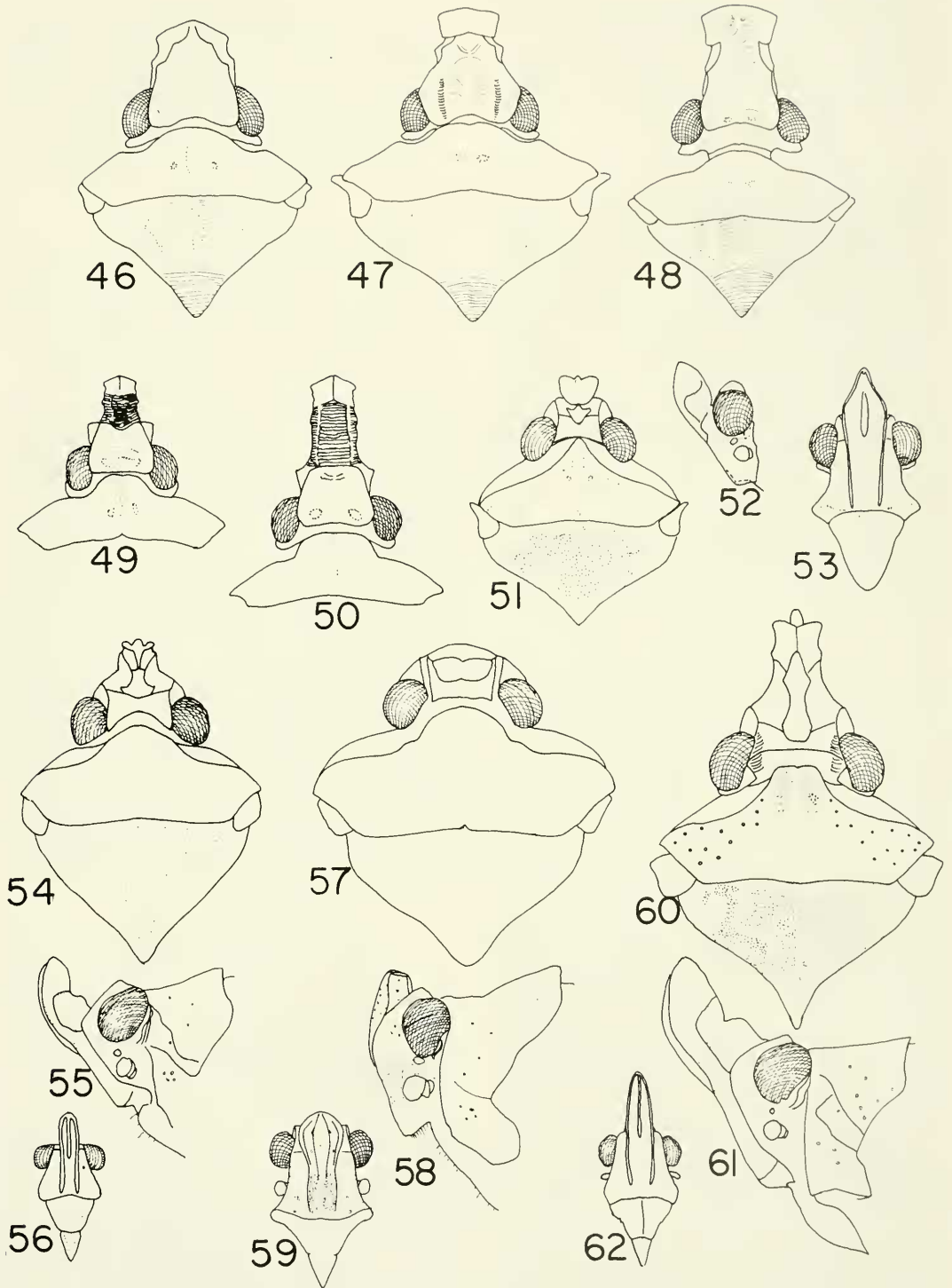
Aphrodisias cacica (Stål)
Fig. 49

Compsoptera cacica Stål 1869:237. Type repository: NRS.

Aphrodisias cacica (Stål), Kirkaldy 1906:248.

LENGTH.—Male 18–20 mm; head 2 mm; ratio, head/pronotum 1.5.

Head process subequal in length to vertex. Hind wing red at base, brown posteriorly. Tegmen brown.



Figs. 46-62. Head and pronotum, dorsal view: 46, *Simuala stali* O'Brien; 47, *S. schmidti* O'Brien; 48, *S. tuberculata* O'Brien; 49, *Aphrodisias cacica* (Stål); 50, *A. shaman* O'Brien. Head and thorax, dorsal view and lateral view, and head, ventral view: 51-53, *Chilobia silena* Stål; 54-56, *C. smaragdina* (Walker); 57-59, *C. cinxia* Stål; 60-62, *C. dichopteroides* (Distant).

DISTRIBUTION.—Holotype (female): MEXICO. I have seen six specimens collected from MEXICO: Alamos, 15 mi S Cuernavaca, Cuernavaca, from September through November.

Aphrodisias shaman, n. sp.

Fig. 50

LENGTH.—Female 23 mm; head 3.5 mm; ratio, head/pronotum 2.3.

Head process 1.7 x longer than vertex. Hind wing pale pink at base, triangular, white area intruding into pink, apex and anal area missing, but edges of anal area brown, apical area brown with white spots.

The wings of this specimen are badly damaged, but it may be separated from *cacica* on the basis of head shape. This specimen has lost its left tegmen and hind wing and part of the right wing, but it is a very distinctive species based on the head alone.

HOLOTYPE (female).—MEXICO: Sinaloa, 5 mi N Mazatlan, 1-VII-1965, J. A. and M. A. Chemsak and E. G. and J. M. Linsley (UCB).

Artacie Stål

Figs. 33–35

Artacie Stål 1866:132. Type species: *Flata haemoptera* Perty, subsequent designation by da Costa Lima 1935:488.

Brown-winged, medium-sized insects, 20–27 mm long. Head process terete, recurved to lie against vertex (Fig. 35), texture of apex unevenly, rugosely tuberculate, ventral median and marginal carina on process, lateral carinae on frons. Pre- and supraocular flanges large (Figs. 33, 34). Pronotum with white nodules. Tegmina with main veins slightly raised, surface concave between them, M 3-branched, cross-veins reticulate in corium, forming rectangular cells in membrane. Red or orange-red color at base of hind wing almost reaching apical margin medially, dividing it into apical and anal areas.

I synonymized the two species in this genus in 1985. After studying additional specimens, I conclude that I was in error and that the artist's illustrations of the species were correct in each case and there is a difference in the shape of the vertex of the two species. The white spots in the apical portion of the wings do vary in size, placement, and number between specimens, but a general pattern for *haemoptera* is described below.

Key to the Species of *Artacie*

1. Median length of head process before preocular flange subequal to median length of vertex *dufourii* (Signoret)
- Median length of head process before preocular flange half of median length of vertex *haemoptera* (Perty)

Artacie dufourii (Signoret), new status

Figs. 34, 35

Encophora [sic] dufourii Signoret 1858:497, pl. 12, no. 2, Fig. 1. Type repository: MZF?
= *Artacie haemoptera* (Perty), O'Brien 1985:661. Error.

LENGTH.—Male 25 mm, female 27 mm; head length 2.6 mm; ratio, head/pronotum 1.4. Length of head process in front of preocular flange subequal to length of vertex.

Wings orangish red at base, white spots scattered through brown apical and anal areas, not forming a figure with an empty center (a square, circle, or diamond).

The two known species may be separated by the proportion of the head process in front of the preocular flange to the vertex, subequal in *dufourii* and about half in *haemoptera* (Figs. 33, 34).

DISTRIBUTION.—Type (not seen): CAYENNE. I have seen two other specimens collected in March from FRENCH GUIANA: Maron River; GUYANA: Wineperu. Part of Signoret's collection went to the Naturhistorisches Museum, Vienna, and part to Museo Zoologico dell'Universita degli Studi di Firenze, Florence, according to Horn and Kahle (1935). I did not see the type in Vienna and have not heard from Florence.

Artacie haemoptera (Perty)

Fig. 33

Flata haemoptera Perty 1833:176, pl. 35, Fig. 3. Type repository: ZSBS, not found.

Artacie haemoptera (Perty), Stål 1866:389.

Encophora [sic] dufourii Signoret, synonymized O'Brien 1985:661. Error.

LENGTH.—Male 20–22 mm, female 23–25 mm; head length 2.1 mm; ratio, head/pronotum 1.2.

Length of head process in front of preocular flange half length of vertex. Wings red at base, brown in apical and anal areas, 4–6 white spots in circle, diamond, or rectangle on apical area, few smaller dots also.

These two species may be separated by the length of the head process and the pattern of white dots on the hind wing.

DISTRIBUTION.—Holotype (not seen): Amazon basin [BRAZIL?]. I have seen nine other specimens collected in March, August, and October from BRAZIL: Canum, Manaus, Obidos, Rio Negro, and Teffe. The type could not be found in the Zoologische Sammlungen des Bayerischen Staates, Munich, in 1975.

Cathedra Kirkaldy

Fig. 26

Cathedra Kirkaldy 1903:179. Type-species: *Phrictus serrata* (F.), original designation.

Pristiopsis Schmidt 1905:332. Type-species: *Fulgora serrata* F., original description; synonymized by Distant 1906:20.

Large, yellowish brown insects, 52–71 mm, head 1/3 length of insect. Head process porrect, terete, gradually narrowed to apex; marginal and lateral carinae of frons produced into 11 and 8 spines, respectively; head about 1/3 length of insect. Preocular flange horizontal, spinelike. Tegmen with M irregularly branched (2 main branches); clavus open; cross-veins forming almost round cells anteriorly, arched and parallel behind nodal line. Hind wings brown with ochre eye spot at apex, pale, elongate spots at base, some waxy spots and dashes throughout; emarginate on posterior border before spot.

This monotypic genus has a head process like a cathedral spire, with many pairs of lateral spines, which distinguishes it immediately from any other fulgorid genera.

Cathedra serrata (Fabricius)

Fig. 26

Fulgora serrata Fabricius 1781:313.

Phrictus serratus (Fabricius), Schaum 1850:65.

Cathedra serrata (Fabricius), Distant 1906:20.

LENGTH.—Male 52–53 mm, female 61–71 mm; head 19 mm; ratio head/pronotum 6.3.

Ground color ochre mottled with brown.

DISTRIBUTION.—Holotype: SURINAME. I have studied eight other specimens collected from January to November from BOLIVIA: Santa Cruz; BRAZIL: Manaus-Itacoatiana road, km 30; PANAMA: Barro Colorado Island. Zimzen (1964) did not list the repository of this Fabrician type.

Chilobia Stål

Figs. 51–62

Chilobia Stål 1863:237. Type-species: *C. cinxia* Stål, subsequent designation by da Costa Lima 1935:497.

Ecuadoria Distant 1906:21. Type-species: *E. dichopteroides* Distant, original designation. *New synonymy*.

Tegmina membranous throughout or membranous in apical half, basal half opaque, brown or brownish red, medium-sized insects, 19–28 mm long. Head process usually recurved, usually dorsoventrally compressed, usually gradually expanding in ventral view towards apex. Lateral carinae of frons parallel or diverging to near base, carinate throughout or becoming broad, fused with median carina into broad hump. Frons elevated above level of frontoclypeal suture, expanded into lobes near apex, with transverse carina extending across frons from lobe to lobe. Vertex with lateral carinae sinuate or angulate in lateral view, supraocular flanges present, apical margin V-shaped, sometimes angulately emarginate medially in addition, sometimes hidden under recurved process. Preocular flange absent. Pronotum with few white nodules. Tegmen with M pectinate (5–8 branches); clavus closed; cross-veins irregular and dense in basal half, few and as thick as longitudinal veins in apical half; longitudinal veins with small spines alternately angled to left or right; transition zone between membrane and opaque area, when present, is arched. Hind wings variable, from only slightly enfumed at base to bright red with sinuate, brown, contiguous area, only two marginal rows of cells enfumed at apex. Female ninth abdominal tergite shorter than eighth.

Because I have intermediates and because the male genitalia are very similar, I have synonymized the genera *Ecuadoria* and *Enhydria* in spite of several character differences. The species of *Ecuadoria* have a long head process and brightly colored tegmen and hind wing, whereas the *Enhydria* species have a short head process, transparent tegmina, and clear hind wings.

The four described species are illustrated, but I have not provided a key because I am unable to determine the range of variation within a species due to lack of available material.

Chilobia dichopteroides (Distant), n. comb.

Figs. 60–62

Ecuadoria dichopteroides Distant 1906:22. Type repository: BMNH.

DISTRIBUTION.—Holotype: ECUADOR (NW): Rio Durango, 350 ft. I have seen no other specimens.

Chilobia cinxia Stål
Figs. 57–59

Chilobia cinxia Stål 1863:238. Type repository: NHMV.

DISTRIBUTION.—Holotype (female): VENEZUELA. I have seen no other specimens.

Chilobia silena Stål
Figs. 51–53

Chilobia silena Stål 1863:238. Type repository: NRS.

DISTRIBUTION.—Holotype (male): ECUADOR: Quito. I have seen no other specimens.

Chilobia smaragdina (Walker)
Figs. 54–56

Dichoptera smaragdina Walker 1851:304. Type repository: BMNH.

Chilobia smaragdina (Walker), Gerstaecker 1895:39.

DISTRIBUTION.—Holotype: VENEZUELA. I have seen no other specimens.

Copidocephala Stål
Figs. 40–42

Copidocephala Stål 1869:235. Type-species: *Enchophora guttata* White, original designation.

Coanaco Distant 1887:28. Type-species: *Enchophora guttata* White, original designation; synonymized by Distant 1906:23.

Medium-sized, greenish or brown or reddish brown insects, 22–32 mm long. Head process recurved at junction with head, laterally compressed, gradually narrowing anterad; lateral carinae of frons fused at junction with process with medium and lateral carinae of process into one large mound; dorsolateral carina also present on process. Preocular flange absent. Pronotum with small, white, hemispherical tubercles, median carina not strongly humped. Tegmen with M usually pectinate (5–6 branches); corium with crossveins regularly, evenly reticulate, with smooth, sunken, red spots without crossveins; membrane with cells subsquare. Female eighth and ninth abdominal tergites subequal in length.

This genus has the head process curved back at the base, never extending forward as in some *Enchophora*; it is scimitar-shaped like *Enchophora* and *Enhydria*. *Copidocephala* differs from *Enhydria*, which has membran-

ous tegmina, and from *Enchophora* in the characters of the thorax given in that generic discussion. The close proximity of the pronotum and eyes suggests that the postocular flange serves to protect the eye from contact with the pronotum.

Key to the Species of *Copidocephala*

- 1. Hind wing black, unspotted *merula* Distant
- Hind wing brown, spotted with red or blue, green or white 2
- 2(1). Large species, 28 mm or longer; hind wing brown with red spots *guttata* (White)
- Small species, 25 mm or less; hind wing brown with blue, green, or white spots *viridiguttata* Stål

Copidocephala guttata (White)
Fig. 42.

Enchophora guttata White 1846:331. Type repository: BMNH.

Copidocephala guttata (White), Stål 1869:236.

LENGTH.—Female 29–32 mm, head length 1.4 mm; ratio, head/pronotum .63. Pronotum and costal margin of tegmen green, pronotum with red, transverse, sometimes broken, band; ground color of rest of insect ranging from yellow or green through red to olive green. Corium with approximately 21 round, smooth, sunken, small (1 mm or smaller), red spots; spots differing slightly in number, size, and placement among individuals. Hind wing brown with red spots in basal two-thirds.

This species may be separated from *merula*, which is similar in size and coloration, by the absence of red spots in the hind wing in *merula*. It differs from *viridiguttata* in size and in the color of spots in the hind wing, blue or green to white spots in *viridiguttata*.

DISTRIBUTION.—Type: South America. I have seen 20 other female specimens collected from March through September, November and January. PANAMA: Barro Colorado Island, Chiriqui Province, Fort Clayton; COSTA RICA: 6 mi W Las Canas, La Selva; HONDURAS: Catacamas, 15 km W La Ceiba; MEXICO: Tamazunchale, Temiscal, Volcan Tacana.

Copidocephala merula Distant
Fig. 40

Copidocephala merula Distant 1906:23. Type repository: BMNH.

Coanaco melanoptera Schmidt 1907:361. Type repository: IZW.

Copidocephala melanoptera (Schmidt), Metcalf 1947: 176. *New synonymy.*

LENGTH.—Female, 34–38 mm.

Ground color as in *guttata* except hind wing black, without red spots.

The differences in coloration of the tegmen found in the two specimens of *merula* and *melanoptera* are within the variation found in the species *guttata*; so on the basis of size and the color of the hind wing, I synonymize the two species.

DISTRIBUTION.—Holotypes: COLOMBIA (both types). I have seen the type of *merula* but not of *melanoptera*. No other specimens seen.

Copidocephala viridiguttata Stål
Fig. 41

Copidocephala viridiguttata Stål 1869:236. Type repository: NHMV.

Coanaco ornanda Distant 1887:29, pl. 4, Fig. 13. Type repository: BMNH.

Copidocephala ornanda (Distant), da Costa Lima 1935: 491. *New synonymy.*

LENGTH.—Male 22–24 mm; head 1.1 mm; ratio of head/pronotum 0.5.

Ground color olive green with black or red-black, sunken, smooth, round spots in same pattern as *guttata*. Hind wing brown with blue or green to white spots.

This species differs from the other two in having blue, green, or white spots in the hind wing rather than red spots or none. It is interesting that I have 13 males of this species for study and 20 females of *guttata*. I will examine other collections to see if this is coincidence or unexpected sexual dimorphism. I synonymize *ornanda* on the basis of the shape of the head process and wing coloration.

DISTRIBUTION.—Type: COLOMBIA (*viridiguttata*); syntypes: PANAMA: Bugaba, Tole (*ornanda*). I have studied 13 other specimens collected from May through September and January from PANAMA: Achiote Road, Barro Colorado Island, Fort Clayton; COSTA RICA: Golfito, La Selva; MEXICO: Los Tuxtlas, 3 mi S Palenque.

Diareusa Walker
Figs. 29–32

Diareusa Walker 1858:43. Type-species: *Phrictus annularis* (Olivier), by monotypy.

Large, reddish brown insects, 32–49 mm, head relatively short, from .1 to .2 length of the insect. Head process porrect, terete,

gradually slightly enlarging at apex; median ventral carina in about anterior third of process, ventral and dorsal lateral carinae complete; short dorsal median carina in anterior portion. Preocular flange vertical, well produced. Tegmen with M sometimes pectinate (3–4 main branches), sometimes evenly branched; cross-veins irregular in corium, forming small squares beyond stigmal line. Tegmen brown throughout with some anterior cells and many spots either white or red; often some apical spots translucent. Female eighth and ninth abdominal tergites subequal in length.

Diareusa are large, reddish brown insects with a comparatively short (.1 to .2 length of insect), terete, but not inflated head without transverse striae or spines; these characters will separate them from other New World Fulgoridae. The species differ in the color of spots in the hind wing and in the shape of the head process.

Key to the Species of *Diareusa*

- 1. Spots on hind wing red and white *conspersa* Schmidt
- Spots on hind wing white only 2
- 2(1). Head process short; vertex and head process as long as width of head, including eye *kemneri* Ossiannilsson
- Head process longer than width of head including eye (Fig. 30) 3
- 3(2). Dorsal surface of head process in lateral view convex (Fig. 31) *annularis* (Olivier)
- Dorsal surface of head process in lateral view straight or concave, not convex (Fig. 32) *imitatrix* Ossiannilsson

Diareusa annularis (Olivier)
Fig. 31

Fulgora annularis Olivier 1791:568. Type repository: unknown.

Phrictus annularis (Olivier), Walker 1851:264.

Diareusa annularis (Olivier), Walker 1858:44.

LENGTH.—Male 32–38 mm, female 45 mm; head 6.2 mm; ratio of head/pronotum 2.2.

Head process in lateral view convex dorsally (Fig. 31.) Hind wings with white spots. These two characters separate it from the other species.

DISTRIBUTION.—Type (not seen): SURINAME. I have seen 10 other specimens collected June to August and January from PERU: Brazilian frontier; BRAZIL: Serra do Navio, Sinop; FRENCH GUIANA: 67 km S Cayenne; SURINAME: Mapane; GUYANA: Shudihat River.

Diareusa conspersa Schmidt

Diareusa conspersa Schmidt 1906:375. Type repository: IZW.

Diareusa dahli Ossiannilsson 1940:44, Fig. 2. Type repository: UZIL. *New synonymy*.

LENGTH.—Male 38 mm, female 46–49 mm; head 5.3 mm, ratio of head/pronotum 1.8.

Hind wings with red spots. Head process similar to that of *imitatrix*.

This is the most easily identified species in the genus with the spots on the hind wing red and white; in all other species they are white. It is interesting that although this is the easiest character for identification, both Schmidt and Ossiannilsson described this character among the last, causing it to be overlooked. Thus, many museums have *imitatrix*, the common Central American species, identified as *conspersa*. I synonymize *conspersa* and *dahli* on the basis of head shape and wing color.

DISTRIBUTION.—Holotypes: ECUADOR: Palmar (*conspersa*); COLOMBIA: Rio San Agustin (*dahli*). I have seen three other specimens collected from June through August from ECUADOR: Amhuagu, Rio Palenque.

Diareusa imitatrix Ossiannilsson

Fig. 32

Diareusa imitatrix Ossiannilsson 1940:45, Fig. 3. Type repository: UZIL.

LENGTH.—Male 35–39 mm, female 43–48; head 5.8 mm; ratio head/pronotum 2.2.

Hind wing with white spots. Head process similar to *conspersa*, but longer and narrower than other species with white-spotted hind wings.

This is the only Central American species and often has been misidentified as *conspersa*. Panamanians call this insect "totoran."

DISTRIBUTION.—Holotype (female): PANAMA: Chiriqui. I have seen 50 other specimens collected all year around from COLOMBIA: Turbo; VENEZUELA: Rancho Grande; PANAMA: Barro Colorado Island, Fortuna, Hartman's Finca, Margarita; COSTA RICA: La Selva, Turrialba; BELIZE: Middlesex; MEXICO: Bonampa R., 1 mi W Fortin de las Flores, Los Tuxtlas.

Diareusa kemneri Ossiannilsson

Fig. 30

Diareusa kemneri Ossiannilsson 1940:43, Fig. 1. Type repository: UZIL.

LENGTH.—Male 35 mm; head 4 mm; ratio,

head/pronotum 1.8.

Hind wings with white spots. Head process short (Fig. 30). *D. kemneri* may be separated from other white-spotted species by the short head process.

DISTRIBUTION.—Holotype (female): PERU: Perene. I have studied one other specimen collected in September from PERU: Aguaitia.

Enchophora Spinola

Figs. 63–76

Enchophora Spinola 1839:221. Type-species: *recurva*, subsequent designation by Duponchel 1840:200.

Medium-sized, reddish brown, green, yellow, or mottled green, white, and red insects, 22–32 mm long. Head process recurved, laterally compressed; nine carinae present on process (all except dorsal median carina). Preocular flange present as vertical carina linking frons and vertex laterally (Fig. 3). Pronotum with pair of deep fossettes laterad of strongly raised median carina. Apex of mesonotum with striate depression between bifurcate median carina. Tegmen with few strong, longitudinal veins, cross-veins variable, dense to average. Female abdominal segments 8 and 9 subequal in length.

Enchophora may be separated from the very similar *Copidocephala* by the raised median carina of the pronotum with a fossette or depression on each side, the depression at the apex of the mesonotum surrounded by a high ridge, and the ventrolateral fields of the pronotum being separated from the eye by a space about the width of the last antennal segment. In *Copidocephala* the callus behind the eye almost touches the pronotum when viewed from above, and the pronotum and mesonotum are smoothly rounded. Both genera lack the preocular flange. *Enhydria*, which also has a scimitar-shaped head process, may be differentiated by its pale tegmen and small spines on the tegminal veins.

The species may be separated by the shape of the head process (although this structure varies slightly in curvature and compression), the color of the hind wings, and sometimes by distinctive marks or colors on the body or wings. Waxy spots on the wings may be helpful if they have not been rubbed off; often they may be identified by a smooth, pale brown area if the wax is missing. The hind wings are usually red, yellow, orange, or white in the basal 1/4 to 2/3, measured along the anterior

margin, or 5/6 if measured from anterior to posterior. The color pattern of the tegmen may be quite variable, as in *sanguinea* Distant, *nigromaculata* Distant, and *recurva* (Olivier) where, in females, the tegmen may be concolorous, marked with discrete red or black spots, or marked with coalescent red spots. Although I have not seen both sexes of every species, if there is a sexual difference in color pattern, the male tends to be more evenly mottled and less variable.

Three species listed as *Enchophora* in Metcalf's (1947) catalog have been transferred since to other genera (see list of species).

Key to the Species of *Enchophora*

- 1. Hind wing with white, waxy points on red area *stillifera* (Stål)
- Hind wing without white, waxy points on red area 2
- 2(1). Head process about twice length of frons before process, enlarged and narrowed near tip (Figs. 63, 64) 3
- Head process less than twice length of frons before process, scimitar-shaped, curved back over vertex, or curved and then bent upward 4
- 3(2). Apex of head process black, broadly trilobed (Fig. 63) *recurva* (Olivier)
- Head process brown throughout, narrowly expanded at apex (Fig. 64) *tuba* (Germar)
- 4(2). Hind wing red in basal half; posterior half medium to dark brown; tegmen brown or reddish brown, often mottled 5
- Hind wing white, pale orange, or brown at base; either only apical 1/4 pale brown or posterior half medium brown (*subviridis*, *tuberculata*); tegmen unmottled green or yellow or green mottled with red 9
- 5(4). Apex of pronotum with transverse, black band (Fig. 66) *nigromaculata* Distant
- Apex of pronotum without transverse, black band 6
- 6(5). Mesonotum with black spots (Figs. 67, 76) ... 7
- Mesonotum without black spots 8
- 7(6). Mesonotum with pair of black spots, also pair on ventrolateral fields of pronotum; head process recurved to near vertex, then bent upward (Fig. 67) *pyrrhocrypta* Walker
- Mesonotum with 2 or 3 pairs of black spots; head process short, only slightly recurved (Fig. 76) *maculata*, n. sp.
- 8(6). Apical fourth of pronotum pale; base of membrane of tegmen with a brown spot about size of eye on each side, 3-5 other such spots usually present on membrane; ca basal half of hind wing red; abdominal tergites brown *pallidipunctata* Lallemand

- Pronotum concolorous; tegmen not as above; ca basal 2/3 of hind wing red; abdominal tergites bright red *sanguinea* Distant
- 9(4). Hind wing white at base 10
- Hind wing yellow, orange, or brown at base 12
- 10(9). Tegmen green or yellowish 11
- Tegmen greenish white mottled with red *rosacea* Distant
- 11(10). Tegmen green or yellowish with white costal margin; head process large (Fig. 71) *prasina* Gerstaecker
- Tegmen greenish yellow throughout; head process small (Fig. 72) *uniformis*, n. sp.
- 12(9). Head process scimitar-shaped (Fig. 74); hind wing yellow at base, then white, then brown at apex *viridipennis* Spinola
- Head process recurved and wrinkled (Figs. 73, 75); hind wing orange at base, brown at apex 13
- 13(12). Head process recurved, then bent upward at apex (Fig. 75) *subviridis* Distant
- Head process recurved almost to vertex (Fig. 73) *tuberculata* (Olivier)

Enchophora maculata, n. sp.
Fig. 76

LENGTH.—Male 24 mm, female 28 mm.

Ground color brown with minute dots of red and green. Head process short, extending forward then dorsad (Fig. 76). Wings brown on apical third, red basally, red extending from anterior to posterior margin. Distinctive markings: two or three pairs of brown spots on pronotum (Fig. 76); anterior spot black, posterior medium brown, sometimes pale brown spot laterad of latter. Abdominal tergites brownish red.

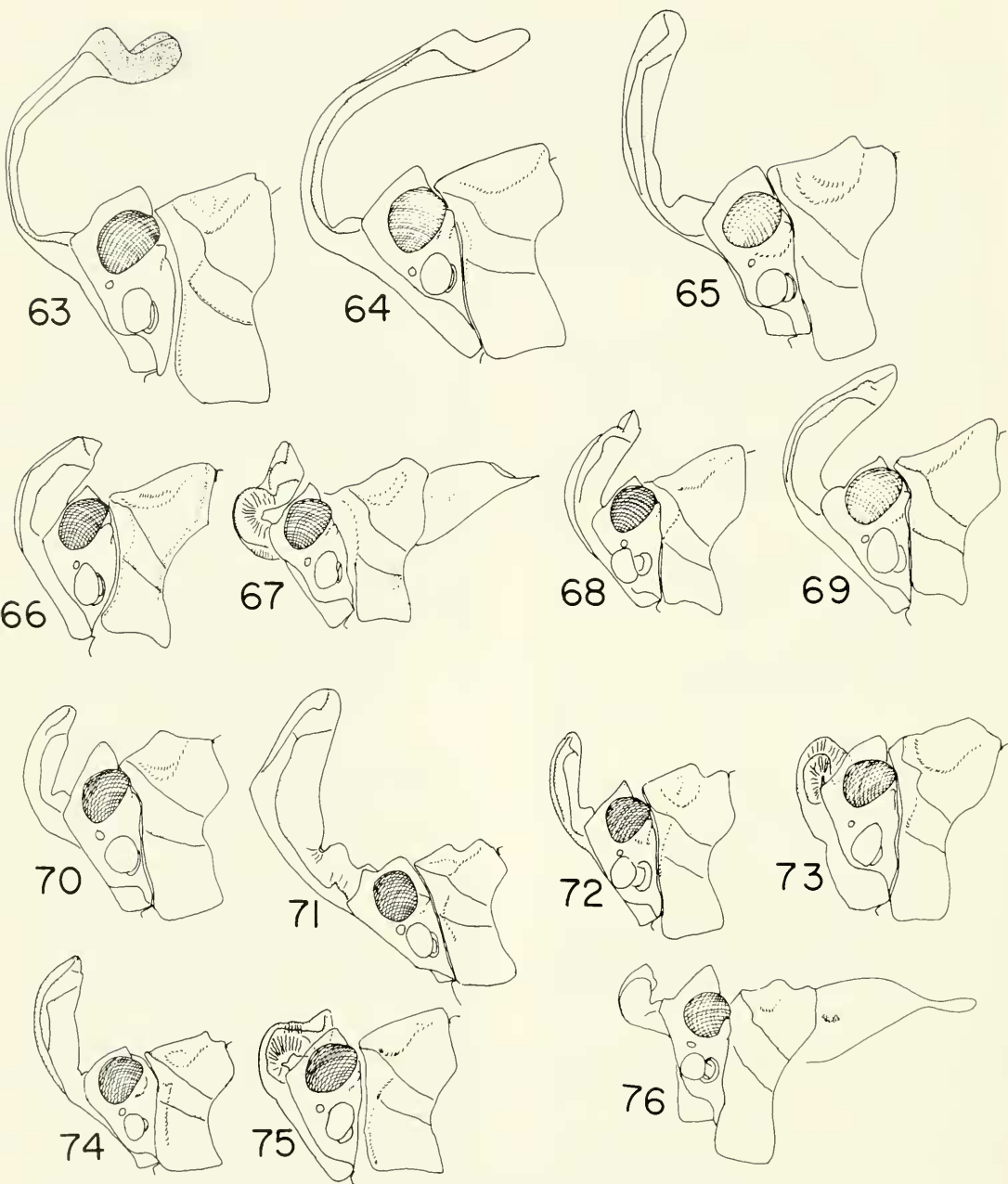
This species may be identified easily by its unusual, short, partially forward-directed head process (Fig. 76) and the spots on the pronotum.

HOLOTYPE (male) AND ALLOTYPE (female).—PERU: Madre de Dios: Rio Tambopata Res., 30 air km SW Pto. Maldonada, 290 m, 16-20-XI-1979, J. B. Heppner, subtropical, moist forest (USNM).

Enchophora nigromaculata Distant
Fig. 66

Enchophora nigromaculata Distant 1906:23. Type repository: BMNH.
E. nigrolimbata Lallemand 1938:350. Type repository: DEI. *New synonymy*.

LENGTH.—Female 24-26mm.



Figs. 63-76. Head and pronotum, lateral view, of *Enchophora*: 63, *E. recurva* (Olivier); 64, *E. tuba* (Germar); 65, *E. stillifera* (Stal); 66, *E. nigromaculata* Distant; 67, *E. pyrrochrypta* Walker; 68, *E. pallidipunctata* Lallemand; 69, *E. sanguinea* Distant; 70, *E. rosacea* Distant; 71, *E. prasina* Gerstaecker; 72, *E. uniformis* O'Brien; 73, *E. tuberculata* (Olivier); 74, *E. viridipennis* Spinola; 75, *E. subviridis* Distant; 76, *E. maculata* O'Brien.

Ground color reddish brown, variable, tegmen may be clear, mottled with yellow veins, or with 10 dark spots; membrane brown or with dark spots, 5 to 7 waxy points along nodal line. Head process scimitar-shaped (Fig. 66). Wings red at base, brown posteriorly.

This species may be separated from all other *Enchophora* by the black line along the hind margin of the pronotum. I have not seen the type of *nigrolimbata*.

DISTRIBUTION.—Holotype: BOLIVIA (*nigromaculata*), PERU (*nigrolimbata*). I have seen

11 other specimens collected from October to January from BOLIVIA: Chapare; BRAZIL: Rio de Janeiro; PERU: Chanchamayo; 30 km SW Puerto Maldonado, 290 m; Satipo; Tingo María; Explorama Lodge; ECUADOR: Parque Nacional St. Cecelia.

Enchophora pallidipunctata Lallemand

Fig. 68

Enchophora pallidipunctata Lallemand 1966:52. Type repository: FSAC.

LENGTH.—Male 23 mm, female 24–26 mm.

Ground color reddish brown, mottled. Head process scimitar-shaped (Fig. 68). Wings red on basal half, brown posterior half (not the usual 2/3 red, 1/3 brown). Seventeen waxy tufts present in apical area. Distinctive markings: pale band along apical fourth of pronotum and five round, dark spots in tegminal membrane, one on each side just behind nodal line, three to five distad of these. Abdominal tergites brown.

This species may be separated from all other *Enchophora* by the pale apical fourth of the pronotum, the dark spots in the membranous area of each tegmen, and the smaller, red portion of the hind wings. It most closely resembles *sanguinea*, which has the abdominal tergites bright red, while they are brown in *pallidipunctata*.

DISTRIBUTION.—Holotype: BOLIVIA: Buena Vista. I have seen 24 other specimens collected from February through April, August and September from BOLIVIA: Buena Vista, Santa Cruz; PERU: Chanchamayo, Chontilla, Iquitos, Lima, Pileopota, 600 m, Rio Santiago, Satipo, Tarapoto. Several specimens labeled on *Copaifera Dourajeanni* (Leguminosae) at Tingo María, but I am unable to find this species listed in any botanical reference.

Enchophora prasina Gerstaecker

Fig. 71

Enchophora prasina Gerstaecker 1895:37. Type repository: EMAU.

LENGTH.—Male 24–27 mm, female, 28 mm.

Ground color green, with costal margin of tegmen white and head and genitalia reddish brown. Head process scimitar-shaped, long, almost as long as mesonotum and pronotum combined. (Fig. 71). Wings white. No waxy tufts evident.

This species may be separated from all other *Enchophora* by the green tegmen with white costal margin.

DISTRIBUTION.—Holotype: COLOMBIA: Nova Granada. I have seen 12 other specimens collected from April through June, and October from BOLIVIA: Buena Vista; PERU: NE; PANAMA: Barro Colorado Island, Cerro Azul, Santa Rita Ridge; COSTA RICA: La Selva.

Enchophora pyrrocrypta Walker

Fig. 67

Enchophora pyrrocrypta Walker 1851:272. Type repository: BMNH.

LENGTH.—Male 19–20 mm, female 23–25 mm.

Ground color reddish brown, mottled. Head process recurved over pronotum, then bent upward (Fig. 67). Wings red at base, brown posteriorly. Two pairs of distinctive, black spots, one on each side of mesonotum, and one on each ventrolateral margin of pronotum (Fig. 67). No waxy tufts evident.

This species may be separated from all other *Enchophora* by the black marks on the lateral fields of the pronotum and on the sides of the mesonotum (Fig. 67). *E. subviridis* has a similarly recurved head process.

DISTRIBUTION.—Holotype: BRAZIL: Para. I have seen seven other specimens collected from October through February from BRAZIL: Benjamin Constant, Rio Negro, Belem, Mangabeira; GUYANA: Kartabo, St. Laurent; VENEZUELA: Cerro de Neblina.

Enchophora recurva (Olivier)

Fig. 63

Fulgora recurva Olivier 1791:34. Type repository: unknown.

Enchophora recurva (Olivier), Spinola 1839: 222, pl. 10, Figs. 1, 2

Enchophora bohemani Stål 1854:244. Type repository: NRS. *New synonymy*.

LENGTH.—Male 24–26 mm.

Ground color reddish brown, tegmen mottled, often with spots composed of yellow clumped veinlets; membrane with long yellow and brown markings. Head process elongate, produced in club that at apex is twice average width of process, apex trilobed, black (Fig. 63). Wings red at base, brown posteriorly. No waxy tufts evident.

This species may be separated from all other *Enchophora* by the enlarged, blackapex of the head process.

DISTRIBUTION.—Holotypes: BRAZIL (*bohemanni*) and SURINAME (*recurva*). I have seen nine other specimens from BRAZIL: Linhares, Araxa, and Painaivas, taken from October through December. I am unable to confirm Berg's report from Argentina (Berg 1879).

Enchophora rosacea Distant

Fig. 70

Enchophora rosacea Distant 1887:27, pl. 4, Fig. 11. Type repository: BMNH.

LENGTH.—Male 22–23 mm, female 25–26 mm.

Ground color green, tegmen at base greenish white with distinctive clumps of red dots between the green veins; membrane green with 20 white, waxy spots. Head process scimitar-shaped (Fig. 70). Wings mostly white, dusted with red spots at base, brown posteriorly.

This species may be separated from all other *Enchophora* by the red and green combination on the tegmen.

DISTRIBUTION.—Holotype: NICARAGUA: Chontales. I have seen 10 other specimens collected from March through August from PANAMA: Barro Colorado Island; COSTA RICA: La Selva.

Enchophora sanguinea Distant

Fig. 69

Enchophora sanguinea Distant 1887:27, pl. 4, Fig. 16. Type repository: BMNH.

Enchophora florens Distant 1887:28, pl. 4, Fig. 12. Type repository: BMNH. *New synonymy*.

Enchophora longirostris Distant 1887:28. Type repository: BMNH. *New synonymy*.

LENGTH.—Male 22–23, female 24–25 mm.

Ground color greenish to reddish, tegmen greenish or reddish, or greenish black with orange or red spots encircled with yellow veins, or the red spots may be fused into large areas or confluences, usually very mottled with clumps of yellow veins and dark and/or light spots. Head process scimitar-shaped (Fig. 69). Wings red at base, brown posteriorly. Twenty waxy tufts present in membranous area of tegmen. Abdominal tergites bright red.

I synonymize this species with two other species; *E. florens* and *longirostris* have the same male genitalia; *E. sanguinea* differs from them only in the pattern of the tegmen. When I found comparable difference in coloration in

other species, I felt confident in synonymizing the three. This species may be separated from all other *Enchophora* with red hind wings by the shape of the head and the lack of distinctive identifying marks such as bands and spots on the pronotum.

DISTRIBUTION.—Type: GUATEMALA, PANAMA (*sanguinea*). NICARAGUA: Chontales (*florens*); COSTA RICA: Cache. COLOMBIA (*longirostris*). I have seen 39 other specimens collected from July to September, with one in February. ECUADOR: Palmar; PANAMA: Barro Colorado Island, Cana 1,200 ft; COSTA RICA: 1 mi N Tucurrique, Rincon, Turrialba, Cairo.

Enchophora stillifera (Stål)

Fig. 65

Phrictus stillifera Stål 1862:303. Type repository: NHMV.

Enchophora stillifera (Stål), Stål 1864:49.

LENGTH.—Male 25–28 mm, female 32 mm.

Ground color greenish brown, tegmen often with spots of clumped yellow veins, also often with broad patches of waxy exudate. Head process elongate, scimitar-shaped, about twice as long as frons below process. Wings red at base, mottled with white, waxy spots; brown posteriorly.

This distinctive species is the only *Enchophora* with many white, waxy spots on the red portion of the hind wing.

DISTRIBUTION.—Holotype (male): MEXICO; GUATEMALA: Sabo; PANAMA: Bugaba, 2,000–3,000 ft. I have seen 24 other specimens collected from June to October from PANAMA: Chiriqui, Lino; COSTA RICA: Osa Peninsula; HONDURAS: Orina del Rio Camgre, Juticalpa; BELIZE: Northern Road, mi 28–45; MEXICO: San Quintin.

Enchophora subviridis Distant

Fig. 75

Enchophora subviridis Distant 1887:28, pl. 4, Fig. 17. Type repository: BMNH.

Enchophora subviridis var. *a.* Distant 1887:497.

Enchophora subviridis distanti Metcalf 1938:358.

LENGTH.—Male 22 mm, female 23–25 mm.

Ground color green, brown, or yellow. Head process reflexed, then turned up at tip. Wings orange in basal half, brown posteriorly; 8 waxy tufts in costal margin of tegmen, 20 plus in membrane.

This species may be separated from all other species but *pyrrhocrypta* by the recurved and bent dorsad head process, and

pyrrhocrypta has distinctive, black spots on the pro- and mesonota and red on the hind wings.

DISTRIBUTION.—Syntypes: PANAMA: Chiriqui, Bugaba. I have seen six other specimens collected from August to October from PANAMA: Chiriqui, Bugaba, 800–1,500 ft; COSTA RICA: Puntarenas Prov., Osa Peninsula, Rincon; San Vito, Golfito.

Enchophora tuba (Germar)

Fig. 64

Fulgora tuba Germar 1830:46. Type repository: Lvov. (All types there are lost.)

Enchophora tuba (Germar), Burmeister 1845:4.

LENGTH.—Female 30 mm.

Ground color reddish brown, mottled. Head process elongate, produced in club that at apex is twice average width of process, apex trilobed, brown like rest of process (Fig. 64). Wings red at base, brown posteriorly. No waxy tufts evident.

This species may be separated from all other *Enchophora* by the long, thin head process with a trilobed, concolorous tip.

DISTRIBUTION.—Type: BRAZIL. I have seen two other specimens collected from BRAZIL: Agua Preta, in December.

Enchophora tuberculata (Olivier)

Fig. 73

Fulgora tuberculata Olivier 1791: 569. Type repository: unknown.

Enchophora tuberculata (Olivier), Burmeister 1845: [4].

Enchophora tuberculata sub. sp. *fuscumaculata* Lallemand 1956:6. Type repository: FSAG.

Enchophora parvipennis Walker 1858:30. Type repository: BMNH. *New synonymy*.

LENGTH.—Male 22 mm.

Ground color greenish brown. Head process recurved toward vertex (Fig. 73). Wings brown, orange in anterior four cells. No waxy tufts evident.

This species may be separated from all other *Enchophora* by the recurved head process, which differs from *pyrrhocrypta* and *subviridis* by not being turned up at the tip. The basal colored area of the hind wing is also more reduced than in any other species; in one specimen it is brown with the four cells slightly paler brown.

DISTRIBUTION.—Type: SURINAME (*tuberculata*); BRAZIL: Para (*parvipennis* male). I have seen two other specimens from FRENCH

GUIANA: St. Jean du Moroni; VENEZUELA: Salto de las Acadencias.

Enchophora uniformis, n. sp.

Fig. 72

LENGTH.—Male 24–26 mm, female 25–26 mm.

Ground color yellow to greenish yellow. Head process scimitar-shaped, shorter than frons below process. Hind wing white with apical third yellowish. Tegmen with margin darker behind stigmal line; this margin with eight spots that may be indicators of waxy tufts. Distinctive markings, brown or black: apex of supraocular flange, three or more dashes along clavus, spots along stigmal line (these are variable; one specimen lacks them all).

This species has a smaller process than *viridipennis* and *prasina*, the only two other species with green or yellow tegmen. It lacks the white costal margin of *prasina* and the yellow-orange base of the hind wing of *viridipennis*.

DISTRIBUTION.—Holotype (male), allotype (female), and 1 paratype (female): PERU: Iquitos, F6062, H. Bassler Colln. Acc. 33591 (AMNH). Four other paratypes: PERU: Chanchamayo [*sic*], from W. F. H. Rosenberg (NCU, male); Jauja Prov. Satipo, Sept. 1946, A. Maller Coll., Frank Johnson Donor (AMNH, female); Dept. Huanuco, Vic. Tingo María, Jungle, 670 m, XII-1939, Felix Woytkowski (AMNH, male); Iquitos, Rio Itaya, Herbert Osborn Colln (OSU, female).

Enchophora viridipennis Spinola

Fig. 74

Enchophora viridipennis Spinola 1839:225, pl. 11, Fig. 2. Type repository: NHMV.

Enchophora eminenta Schmidt 1909:187. Type repository: IZW. *New synonymy*.

LENGTH.—Male 22 mm.

Ground color yellow brown (given as green in original description). Head process scimitar-shaped, shorter than most other species (Fig. 74). Hind wings yellow-orange at base, posteriorly white with ochre veins. More than 10 waxy tufts present along slightly infuscate margin of tegmen.

This species may be separated from all other *Enchophora* but *uniformis* by the coloration of the hind wings. In the specimen examined the distinctive color markings are

the shiny, black apex of the head process, a black spot on each side of the frons before the eye, five very small, red marks on the tegmen, red longitudinal lines on the clypeus, a diagonal, red, marginal band on each side of the pronotum, and the browner wing margin. Schmidt (1909) described the clypeus as having blood-red longitudinal stripes, the apex of the clypeus, the pronotum and scutellum, the legs, and the five spots on the tegmen blood red. The specimen at hand has fainter coloration. Spinola (1839) said that the spots on the tegmen are black. I did not have a specimen to compare with either of these types when I visited their respective museums; so, I am placing them in synonymy by utilizing their descriptions and illustrations and my notes.

DISTRIBUTION.—Holotype: BRAZIL: Pebas (*eminenta*), locality unknown (*viridipennis*). I have seen one specimen from BRAZIL: Jacareacanga, collected in February.

Enhydria Walker
Figs. 36–39

Enhydria Walker 1858:44. Type-species: *Dichoptera tessellata* Walker, by monotypy.

Ulubra Stål 1866:133. Type-species: *U. brachialis* Stål, by monotypy. Synonymized by Stål 1870:286. *Ulubra* resurrected by O'Brien 1985:662. [Error] *New synonymy*.

Medium-sized, brown insects with transparent tegmina, 19–22 mm long. Head process recurved, laterally compressed, gradually narrowing to apex. All five ventral carina and two dorsolateral carina present, complete; dorsal median carina present at base of process, extending as far as dorsal notch. Pre-ocular flange horizontal, small. Pronotum with white nodules. Tegmen with short spines along veins on upper surface, M not pectinate; cross-veins along costal margin dense, diagonal; other cross-veins not dense, about same diameter as longitudinal veins; most cells rectangular. Female with eighth and ninth abdominal tergites subequal.

This genus may be separated by the short spines on the veins on the upper surface of the tegmen and the transparent, brown hind wing. The dorsal head measurement and head/pronotal ratio were not made in this genus because the length varies greatly with the position of the head process.

I resurrected *Ulubra* as a valid genus on the

basis of illustrations and notes taken from a specimen so identified at the British Museum. Recently, I discovered a photograph of the type of *Ulubra brachialis* taken in Stockholm; and it is a synonym of *tessellata*. The genus I resurrected as *Ulubra* is renamed below as *Stalubra* (*q. v.*).

All species of *Enhydria* have a similar color pattern: brown insects with red spots on the pronotum, black markings on the head process, etc. They may be identified to species by the length and shape of the head process.

Key to the Species of *Enhydria*

- 1. Head in lateral view with distance from fronto-clypeal suture to dorsal notch greater than length from dorsal notch to apex, thus process short (Figs. 37, 38) 2
- Head in lateral view with distance from fronto-clypeal suture to dorsal notch on process less than length from dorsal notch to apex, thus process long (Fig. 36) *longicornuta* Lallemand
- 2(1). Venter of process black; thickness of process in lateral view about 1/2 width of eye (Fig. 38) ...
..... *cicadina* Gerstaecker
- Venter of process pale with brown spots, only tip black; thickness of process in lateral view subequal to width of eye (Fig. 37)
..... *tessellata* (Walker)

Enhydria cicadina Gerstaecker
Figs. 38, 39

Enhydria cicadina Gerstaecker 1895:38. Type repository: EMAU.

LENGTH.—Male 19.5–21.5 mm.

This species has the shortest head process (Fig. 38).

MALE GENITALIA.—The two pairs of inflatable lobes have darkened, tuberculate tips, which the other species do not have.

DISTRIBUTION.—Syntypes: BRAZIL: Bahia. I have seen six other specimens collected in December from BRAZIL: Caviuna, Iguazu Falls, and Tijuco Preto.

Enhydria longicornuta Lallemand
Fig. 36

Enhydria brachialis f. *longicornuta* Lallemand 1960:106. Type repository: NRS.

Enhydria longicornuta Lallemand, O'Brien 1985:661.

LENGTH.—Male 20–22 mm, female 20–22 mm.

This species has the longest head process (Fig. 36).

MALE GENITALIA.—The ventral lobe in ventral view has a slight median projection and is

about half as wide as the claspers.

DISTRIBUTION.—Holotype: BRAZIL. I have seen five other specimens collected from BRAZIL: Manaus, Serro do Navio, and TRINIDAD.

Enhydria tessellata (Walker)

Fig. 37

Dichoptera tessellata Walker 1851:305. Type repository: BMNH.

Enhydria tessellata (Walker), Walker 1858:44.

Enchophora brachialis Stål 1862:1. Type repository: NRS. *New synonymy*.

Enhydria brachialis (Stål), da Costa Lima 1935:497.

LENGTH.—Male 19–20 mm, female 21–22 mm.

This species has a medium-length head process (Fig. 37).

MALE GENITALIA.—Ventral lobe of the aedeagus with median emargination, ventral lobe about as wide as claspers.

DISTRIBUTION.—Holotype: BRAZIL: Rio de Janeiro (*brachialis* male); Para (*tessellata* female). I have seen 11 other specimens collected in January, March, June, and October from BRAZIL: Corcovado, Faz Morelandia, Corupa, and Para; PERU: Tingo María.

Fulgora Linnaeus

Figs. 77–92

Fulgora Linnaeus 1767:703. Type-species: *F. laternaria* (Linnaeus), subsequent designation by International Commission on Zoological Nomenclature, Opinion 322 (1954:187).

Large insects, 65–105 mm in length, yellowish brown mottled with black markings and white, waxy areas, head .25 to .28 length of insect. Head process porrect, terete, inflated, resembling a peanut from above and an alligator head, including false eye spots, in lateral view. Preocular flange large, horizontal. Tegmen with M not pectinate, most cross-veins forming many-sided, almost round cells. Female with abdominal tergites eight and nine subequal in length.

At the museum in Sao Paulo, I examined the specimens used by da Fonseca (1926) in his revision; these did not fit his key. B. V. Ridout (personal communication) examined previously used characters and several new features, including male genitalia and the results of morphometric analyses, and found the best way to identify species in this genus was to match specimens to the accompanying illustrations of head shapes. His illustrations

are labeled lectotype except for *lampetis* (holotype), *crocodilia*, and *lucifera*. I give him full credit for this section and am convinced that this is the best that can be done at this time. Any errors are mine.

Ridout suggested that species with narrow heads might live in dry forests, the others in rain forests. Janzen (1983) described the behavior of *F. laternaria*, including at least 100 specimens seen resting on *Hymenaea courbaril* or guapinol, but questioned whether this plant is the host or only host, as it does not extend throughout the range of the insect species.

Fulgora castresii Guerin-Meneville

Figs. 81, 82

Fulgora castresii Guerin-Meneville 1837:3, pls. 173, 174, Figs. 3, 4.

DISTRIBUTION.—Type: MEXICO. I have seen 10 specimens collected from July through September from MEXICO: Hustusco, Nuevo X-Can [*sic*], Tamazunchale; PERU: Tingo María; PANAMA: Barro Colorado Island.

Fulgora cearensis Fonseca

Figs. 87, 88

Laternaria cearensis Fonseca 1932:3, Figs. 1, 2, 3h.
Fulgora cearensis Fonseca, Metcalf 1947:219.

DISTRIBUTION.—Type: BRAZIL. I have seen two specimens from TRINIDAD: Curepe and Maraval, collected in September.

Fulgora crocodilia

Brailovsky & Beutelspacher

Figs. 85, 86

Fulgora crocodilia Brailovsky & Beutelspacher 1978:176, pl. 3.

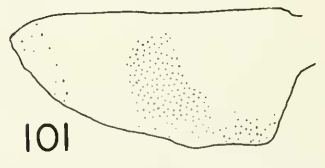
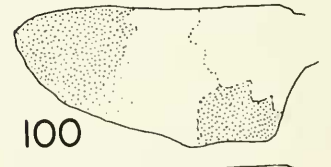
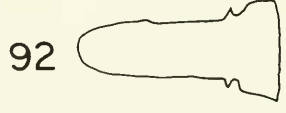
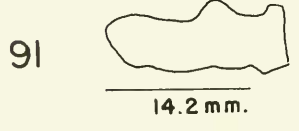
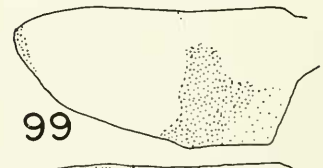
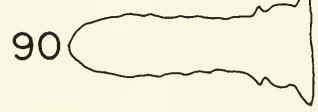
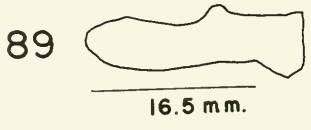
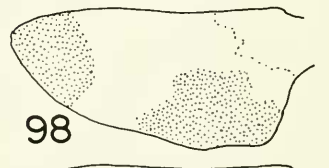
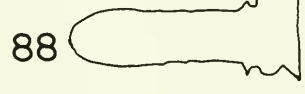
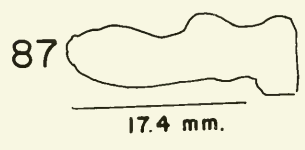
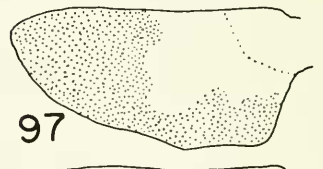
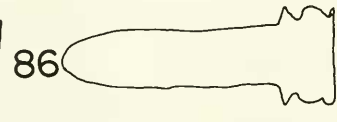
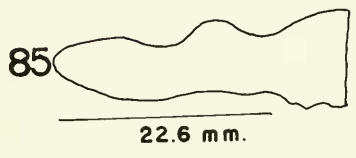
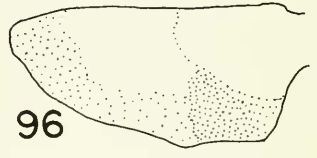
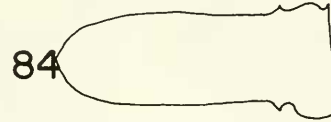
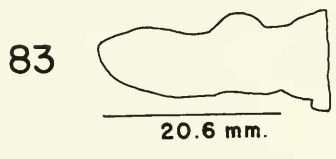
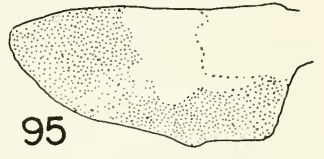
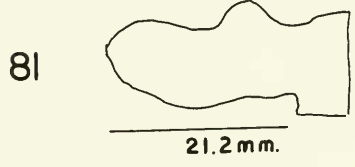
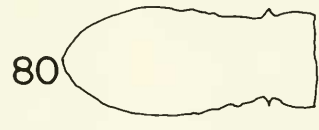
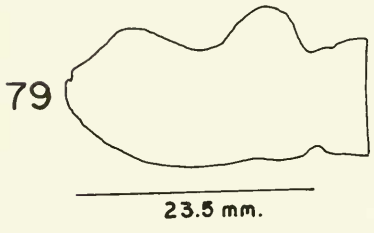
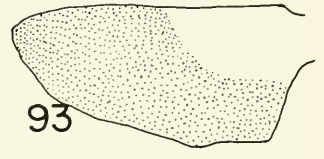
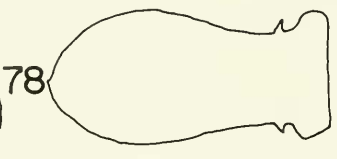
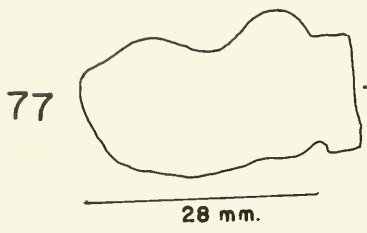
DISTRIBUTION.—Type: MEXICO. I have seen three specimens collected from MEXICO: Chamela, in September and November.

Fulgora graciliceps Blanchard

Figs. 83, 84

Fulgora graciliceps Blanchard 1849:pl. 2, Fig. 1.
Laternaria orthocephala Fonseca 1926:493, pl. 6, Figs. 1, 2. *New synonymy*, Ridout.
Fulgora orthocephala Fonseca, da Costa Lima 1942:42.

DISTRIBUTION.—Type: BRAZIL (*orthocephala*, *graciliceps* unknown). I have seen three specimens from BOLIVIA: Requena and Warnes, and PERU: Tingo María, collected in November.



Figs. 77-101. Head, dorsal view (odd numbers), lateral view (even numbers); 77-78, *Fulgora lampetis* Burmeister; 79-80, *F. laternaria* (L.); 81-82, *F. castresii* Guerin-Meneville; 83-84, *F. graciliceps* Blanchard; 85-86, *F. crocodilia* Brailovsky & Beutelspacher; 87-88, *F. cearensis* Fonseca; 89-90, *F. lucifera* Cernar; 91-92, *F. riograndensis* Fonseca. Hind wings of *Amycle*: 93, *A. saxatilis* Van Duzee; 94, *A. sodalis* Stål; 95, *A. mankinsi* O'Brien; 96, *A. pinyonae* K & K; 97, *A. vernalis* Manee; 98, *A. grandis* O'Brien; 99, *A. brevis* O'Brien; 100, *A. tumacacoriae* K & K; 101, *A. amabilis* (Westwood).

Fulgora lampetis Burmeister

Figs. 77, 78

Fulgora lampetis Burmeister 1845:3.

DISTRIBUTION.—Type: BRAZIL. I have seen 11 specimens collected throughout the year from BOLIVIA: La Cordillera Santa Cruz; PERU: Tingo María; BRAZIL: Obidos, Sinop; PANAMA: Barro Colorado Island; COSTA RICA: Sarapiquí; NICARAGUA: Leon; HONDURAS: La Ceiba.

Fulgora laternaria (Linnaeus)

Figs. 79, 80

Cicada laternaria Linnaeus 1758:434.*Fulgora laternaria* Linnaeus, Linnaeus 1767:703.*Fulgora servillei* Spinola 1839:214. *New synonymy*, Ridout.

DISTRIBUTION.—Type: Tropical America (*laternaria*); BRAZIL (*servillei*). I have seen five specimens collected in January, and April through July in PANAMA: Barro Colorado Island; HONDURAS: Armenta, La Ceiba; MEXICO: Los Tuxtlas.

Fulgora lucifera Germar

Figs. 89, 90

Fulgora lucifera Germar 1821:100.*Fulgora mitrii* Burmeister 1867:xxiii, Berg 1879:178.

DISTRIBUTION.—Type: BRAZIL. I have seen 16 specimens collected from November through February from ARGENTINA: Abra Grande Iran; BOLIVIA: Coipa, El Torno, Mora Abado Iz., Montero, Santa Cruz, and Warnes.

Fulgora riograndensis Fonseca

Figs. 91, 92

Laternaria servillei riograndensis Fonseca 1926:486, pl. IV, Fig. 1.*Laternaria riograndensis* Monte 1932:22.*Fulgora riograndensis* Fonseca, Metcalf 1947:232.

DISTRIBUTION.—Type: BRAZIL. I have seen one specimen from PANAMA: Barro Colorado Island, collected in June.

Odontoptera Carreno

Figs. 44, 116, 117

Odontoptera Carreno 1841:275. Type species: *O. spectabilis* Carreno, by monotypy.

Medium-sized, green or brown insects, 27–37 mm long, head 1/6 to 1/3 length of insect. Head process porrect, terete, elongate triangular; apex bent dorsad; lateral carinae of dorsum and venter and pleural carinae all visi-

ble. Preocular flange small, diagonal or horizontal. Ventropleural carina of pronotum present, dorsopleural carina absent, represented by low ridge. Tegmen with apex truncate; anal angle angulate; dark spot along stigmal line; M greatly expanded, 16–19 branches at level of stigmal line; cross-veins incomplete in corium, forming rectangular cells in membrane. Female with eighth and ninth abdominal tergites subequal in length.

Cathedra serrata and the two species of this genus are the only Fulgoridae with head processes which I have never seen misidentified.

Key to the Species of *Odontoptera*

1. Head about 1.5 times as long as pro- and mesonota combined; tegmen green with narrow, apical, brown band; hind wing green with brown and orange markings *carrenoi* Signoret
- Head almost as long as pro- and mesonota combined; tegmen orange-brown basally, brown behind pale, thin, nodal band; hind wing white at base, brown apically *spectabilis* Carreno

Odontoptera carrenoi Signoret

Figs. 44, 117

Odontoptera carrenoi Signoret 1849:178, pl. 6, Fig. 4. Type repository: NHMV.

LENGTH.—Male 27–28 mm, female 30–33 mm; head length 9.7 mm; ratio, head/pronotum 5.4.

Ground color green with brown apical band on tegmen, round, black spot surrounded by white line at apex of clavus on stigmal line (Fig. 44). Hind wing green with two black spots near anal angle, spots surrounded by orange area.

This species is green with a more elongate head than the brown *spectabilis*.

DISTRIBUTION.—Holotype: locality unknown. I have seen 26 other specimens, collected May to October and February, from: BRAZIL: Sinop; FRENCH GUIANA: Montagne des Singes near Kourou; 67 km S Cayenne; PANAMA: Barro Colorado Island, Santa Rita Arriba, Parque Nacional Soberania Frijolito; COSTA RICA: La Selva; MEXICO: Los Tuxtlas.

Odontoptera spectabilis Carreno

Fig. 116

Odontoptera spectabilis Carreno 1841:277, pl. 5, Fig. 2. Type repository: ZMHB.

LENGTH.—Female 36–37 mm; head length 5.8 mm; ratio, head/pronotum 2.3.

Ground color yellow-orange on head, thorax, and apical part of tegmina, tegmen behind stigmal line brown. Head, thorax, and tegmen with lateral, longitudinal, brown band extending half length of costa. Hind wing white, black along apical margins, tinged with orange at base.

This species is brown and has a shorter head than the green *carrenoi*.

DISTRIBUTION.—Type: America (?). I have seen four other specimens, collected from January to March, from BRAZIL: Boraceia Field Station and Corupa.

Phrictus Spinola
Figs. 102–115

Phrictus Spinola 1839:216. Type-species: *Fulgora didadema* Linnaeus by monotypy.

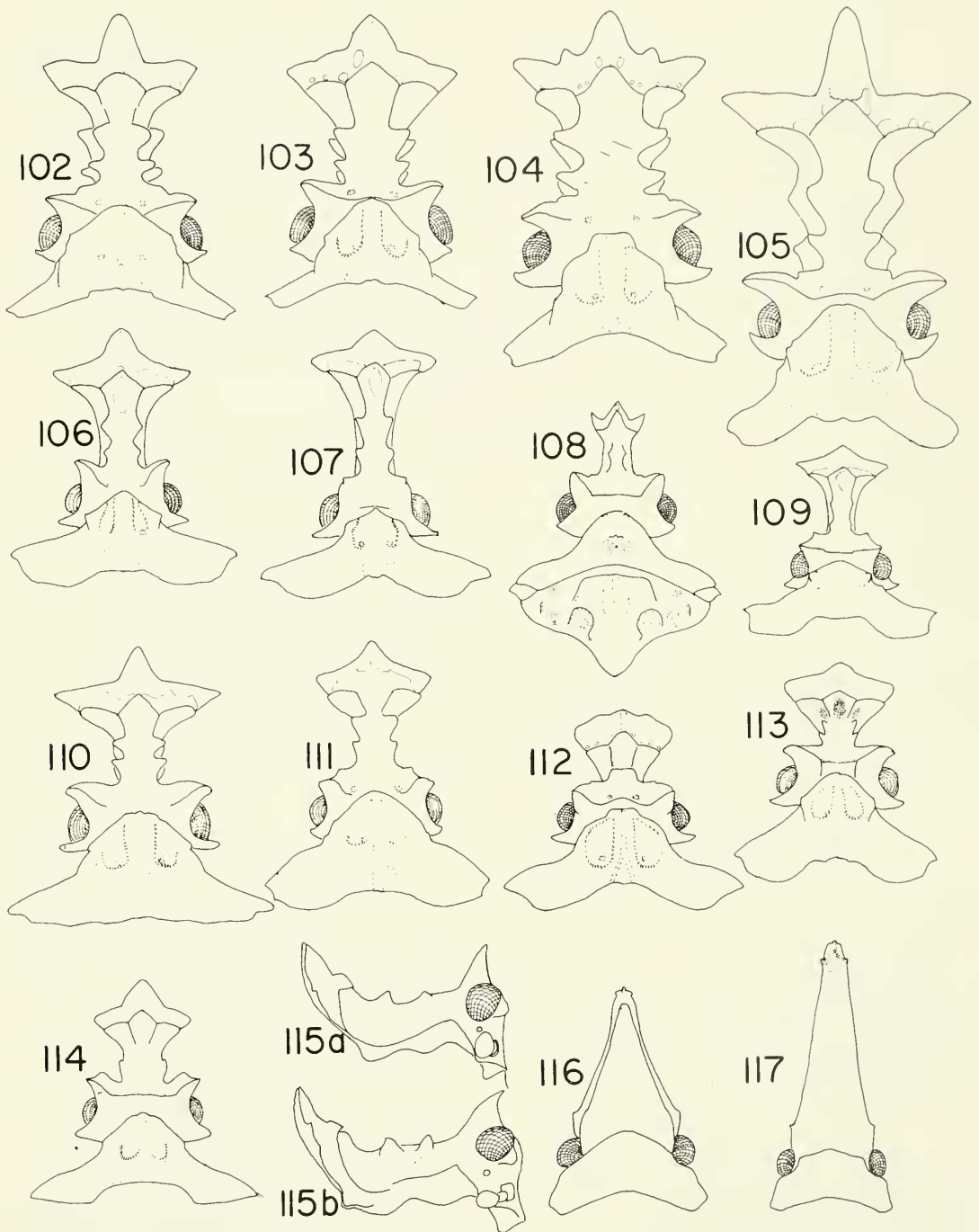
Large, reddish brown or yellowish brown insects, rarely yellow and green, 29–53 mm; head 1/8 to 1/4 length of insect. Head process porrect, terete, usually enlarged into trifurcate apex (Figs. 102–115); dorsolateral carinae each with two pairs of spines, ventrolateral carinae each produced into flange near frontoclypeal suture and into small, dull spine at junction of frons and clypeus. Preocular flange horizontal, small; supra- and postocular flanges produced into strong spines. Tegmen with M not pectinate, cross-veins reticulate in corium forming square cells behind stigmal line. Female with ninth tergite medially shorter than eighth.

These beautiful insects with a name that means “horrible” or “terrible” may be identified by the shape of the apex of the head process and the waxy tufts on it, the color pattern of the tegmina, and the color of the hind wings. Caldwell (1945) also used the median notch in the caudal margin of the pronotum and variation in the furcation of the median carina around the notch, which I found difficult to quantify. The female first valvulae, as he illustrated, also serve to identify difficult specimens. The apex and venter of the head process are usually reddish orange or reddish brown with a white stripe down the dorsum reaching the apex of the pronotum. There are several color patterns on the tegmina which will be discussed under species descriptions. I have illustrated the head process with the insect at approximately a 45-degree angle in order to provide a good view of the apex.

Because this makes the length of the head and process difficult to determine, I have included a head length and head/pronotum ratio.

Key to the Species of *Phrictus*

1. Head process flattened apically, transversely arcuate, lacking definite apical teeth (Fig. 112); base of hind wing yellow with transverse bands of brown maculae *auromaculatus* Distant
- Head process with 3 to 5 apical teeth (Figs. 106–111, 113, 114); hind wing lacking transverse bands of brown maculae 2
- 2(1). Head process with 5 apical teeth (Fig. 104) *quinquepartitus* Distant
- Head process with 3 apical teeth 3
- 3(2). Hind wing with large (ca 2 mm), hyaline, apical spots, visible from below with wing unspread 4
- Hind wing without hyaline, apical spots, but small pruinose areas sometimes present, visible when wings are spread 5
- 4(3). Hind wings yellow or orange at base; head process with 3 black spots dorsally just behind apical area (Fig. 113) *xanthopterus* Schmidt
- Hind wing red at base; head process with no black markings near apex, but diamond-shaped, red area in same position (Fig. 107) *ocellatus* Signoret
- 5(3). Basal area of hind wing yellow or yellow-orange *moebiusi* Schmidt
- Basal area of hind wing red or reddish orange 6
- 6(5). Tegmen with continuous, broad, yellow, transverse fasciae present 7
- Tegmen lacking transverse fascia, or, if present, interrupted medially 8
- 7(6). Tegmen brown, transverse fascia yellow only *diligens*, n. sp.
- Tegmen scarlet with green veins, anterior edge of fascia partially bordered with black *tripartitus* Metcalf
- 8(6). Transverse fascia absent, apical trident of head process 2/3 as wide as distance between supraocular spines (Fig. 108) *delicatus*, n. sp.
- Transverse fascia interrupted medially; apical trident of head process wider (Figs. 105, 106, 109, 110) 9
- 9(8). Head process with apical teeth broader than head (Fig. 105); hind wing with black or fuscous area covering apical three-fourths *regalis* Caldwell
- Head process with apical teeth not wider than head (Figs. 106, 109, 110); hind wing with black or fuscous areas covering apical third . . . 10
- 10(9). Tegmen green in basal two-thirds, with a few small, round, red or orange maculae; apical third with large, brown spots *hoffmannsi* Schmidt



Figs. 102–117. Head and pronotum, dorsal view, drawn with head process at 45-degree angle so that the apex is horizontal: 102, *Phrictus diadema* L.; 103, *P. tripartitus* Metcalf; 104, *P. quinquepartitus* Distant; 105, *P. regalis* Caldwell; 106, *P. punctatus* Caldwell; 107, *P. ocellatus* Signoret; 108, *P. delicatus* O'Brien; 109, *P. minutacanthis* Caldwell; 110, *P. hoffmansi* Schmidt; 111, *P. moebiusi* Schmidt; 112, *P. auromaculatus* Distant; 113, *P. xanthopterus* Schmidt; 114, *P. diligens* O'Brien; 115a, *P. diadema* (L.) and 115b, *P. tripartitus* Metcalf (head, lateral view); 116, *Cathedra spectabilis* Carreno; 117, *O. carrenoi* Signoret.

- Tegmen brown or reddish brown, sometimes with yellow spots 11
- 11(10). Tegmen some shade of reddish brown, with pink, calloused areas present, especially basally; head process toothed on ventral surface (Fig. 115a) *diadema* (Linnaeus)
- Tegmen brown, maculate with yellow; head process not toothed ventrally 12
- 12(11). Combined length of head process and head as long as pronotum; expanse of trifurcate apex equal to distance between ocular spines (Fig. 109) *minutacanthis* Caldwell
- Combined length of head process and head longer than pronotum; expanse of apex much greater than distance between ocular spines (Fig. 106) *punctatus* Caldwell

Phrictus auromaculatus Distant
Fig. 112

Phrictus auromaculatus Distant 1905:672. Type repository: BMNH.

Phrictus notatus Lallemand 1931:188. Type repository: FSAG, NRS. *New synonymy*.

LENGTH.—Male 29–32 mm, female 34–35 mm; head length 3.7 mm; ratio, head/pronotum 1.0.

Head process semicircular at apex, not divided into teeth, orange-red; three round, waxy plates on each side (Fig. 112). Tegmen evenly pale brown mottled with yellow, veins dark brown in corium, no transverse fascia. Hind wings yellow at base, brown posteriorly; two maculate, brown bands from anal area running into yellow area.

This species is easily separated by the apex of the head not being divided into spinelike segments. It may be verified by the yellow base of the hind wings and the evenly colored tegmina.

DISTRIBUTION.—Syntypes: BOLIVIA (*auromaculatus*); ECUADOR (*notatus*). I have seen five other specimens collected from BOLIVIA: Santa Cruz; Prov. Sara [*sic*], 450 m; BRAZIL: Sinop; PERU: Jauja Prov., Satipo.

Phrictus delicatus, n. sp.
Fig. 108

LENGTH.—Female 36 mm; head length 3.7 mm; ratio, head/pronotum 1.3.

Head process tripartite, lateral portions directed anterad, not laterad, smaller than that of *minutacanthis*; head pale brown (Fig. 108). Mesonotum with three pairs of dark spots (pin is placed through apex; there may or may not be one there). Tegmen evenly colored, no

fascia. Hind wings red basally, posteriorly pale brown.

This species may be identified by the pale brown, narrow head process, without a white dorsal stripe and red venter and apex. The pale apex of the hind wings separates this species from all but *moebiusi*. The evenly colored tegmen, broader and less rooflike than most of the species, is similar to that of *auromaculatus* and *ocellatus*.

HOLOTYPE (female).—BRAZIL: Amazonas, S. Paulo de Olivenca, VII-32, A. Maller Colln., Frank Johnson Donor (AMNH). The printed label says S. P. Olivenca/ Amazonas/ Brasil VII-32. The handwritten label underneath gives the more complete data.

Phrictus diadema (Linnaeus)
Figs. 102, 115a.

Fulgora diadema Linnaeus 1767:703. Type repository: UZIU.

Phrictus diadema (Linnaeus), Spinola 1839: 219.

LENGTH.—Male 38 mm, female 45 mm; head length 8 mm; ratio, head/pronotum 2.0.

Apex of head process trifurcate, three or four pairs of lateral, waxy plates and one median oval (Fig. 102). Ventral margin of head process in lateral view sinuate. Hind wings red at base. Tegmina mottled with red and brown in large splotches, transverse, yellowish fascia narrow, not bordered anteriorly in black.

This species most closely resembles *regalis* in the mottled color pattern of the tegmen and pale, transverse fascia and the sinuate ventral margin of the head process in lateral view, but *regalis* has a much wider, trifurcate apex on the head process, exceeding the distance between the tips of the supraocular spines (Fig. 105). In *diadema* the spines and apex are about the same width.

DISTRIBUTION.—Type: INDIA ? [error]. I have seen two other specimens collected in November from BRAZIL: Linhares.

Phrictus diligens, n. sp.
Fig. 114

LENGTH.—Female 40–43 mm; head length 6 mm; ratio, head/pronotum 1.3.

Apex of head process trifurcate, narrow band of waxy plates each side (Fig. 114). Hind wings red at base. Tegmen evenly brown with unbroken clear transverse fascia.

This species may be identified easily by the

brown tegmen with the unbroken transverse band. I name it *diligens*, which means prim, because it is more conservative in color and shape of head process than the other species. It is most closely related to *diadema* and *regalis* in the color pattern of the tegmen.

HOLOTYPE (female).—COLOMBIA: 1,500 ft, Anchicaya, 26-VII-1970, J. M. Campbell (LOB). **Paratype** (female): COLOMBIA: Dept. El Valle, Anchuaya, 200–300 mi, 27-IV-1969, Gonin-H Balazar-S. Draachler Rec. (MNHP).

Phrictus hoffmannsi Schmidt

Fig. 110

Phrictus hoffmannsi Schmidt 1905:338. Type repository: IZW.

LENGTH.—Male 37 mm, female 48 mm; head length 7 mm; ratio, head/pronotum 1.0.

Apex of head process trifurcate, large, squarish, waxy plate area on each side (Fig. 110). Hind wings red at base. Tegmina green mottled with yellowish orange in large splotches, clavus predominately orange, broad, transverse, yellow fascia interrupted by brown spots medially and toward commissure, membrane yellowish brown with brown oval spots.

This species may be distinguished easily by its bright green and yellowish orange tegmen.

DISTRIBUTION.—**Holotype** (female): PERU: Chanchamayo. I have seen four other specimens collected in January from PERU: Tingo María; ECUADOR: Guayaquil, Loja.

Phrictus minutacanthis Caldwell

Fig. 109

Phrictus minutacanthis Caldwell 1945:180, pl. 7, Figs. 2, 16, pl. 8, Fig. 2, pl. 9. Type repository: USNM.

LENGTH.—Female 36 mm; head length 4.8 mm; ratio, head/pronotum 1.5.

Apex of head process trifurcate, small; waxy plate on each side; pale red, midline near apex with reddish triangle (Fig. 109). Hind wings red at base. Tegmina light brown evenly mottled with yellow, transverse yellowish fascia indistinct, broken.

This species may be identified by its small head. It resembles *xanthopterus* and *punctatus* most closely in the light brown tegmen with yellow markings, and *ocellatus* and *punctatus* in having the red subapical triangle on the pale dorsum of the head process.

DISTRIBUTION.—**Holotype**: PERU: Chanchamayo. I have seen only the type.

Phrictus moebiusi Schmidt

Fig. 111

Phrictus moebiusi Schmidt 1905:335. Type repository: ZMHB.

Phrictus sordidus Caldwell 1945:180, pl. 7, Figs. 3, 20, pl. 8, Figs. 1, 13, pl. 9. Type repository: USNM. *New synonymy*.

LENGTH.—Male 40 mm, female 43–48 mm; head length 6 mm; head/pronotal ratio 1.2.

Apex of head process trifurcate, large, waxy plate on apex (Fig. 111). Hind wings yellow at base, posterior pale brown. Tegmina brown evenly mottled with yellow, transverse fascia pale, broad, interrupted by two brown spots in middle and near commissural margin.

This is one of three species with yellow coloration at the base of the hind wing. *P. auromaculatus* has a head process without apical spines, and *xanthopterus* has white spots in the posterior brown area of the hind wing. The type of *sordidus* is a pale specimen that agrees in all external characters with *moebiusi*.

DISTRIBUTION.—**Syntype** (female): COLOMBIA: Antioquia (*moebiusi*); ECUADOR (male holotype *sordidus*). I have seen four other specimens collected in January from "New Granada" and ECUADOR: Route Mono-Los Banos, km 37, 2,385 m.

Phrictus ocellatus Signoret

Fig. 107

Phrictus ocellatus Signoret 1855:v. Type repository: NHMV.

LENGTH.—Male 35 mm, female 42 mm; head length 6.0; ratio, head/pronotum 1.9.

Apex of head process trifurcate; large, waxy plates on each side; red diamond and median line along pale dorsum of process (Fig. 107). Hind wings red at base, white spots in brown posterior area. Tegmina evenly mottled with pale yellow and red brown, no fascia.

Two species have hind wings with white spots in the brown posterior area, *xanthopterus* with a yellow base and *ocellatus* with a red base.

DISTRIBUTION.—**Holotype** (female): COLOMBIA: Fusagasuga. I have seen two other specimens collected in June from VENEZUELA: Rancho Grande.

Phrictus punctatus Caldwell

Fig. 106

Phrictus punctatus Caldwell 1940:181, pl. 7, Figs. 12, 23, pl. 8, Fig. 6, pl. 9. Type repository: USNM.

LENGTH.—Female 40 mm, head length 6.5 mm; ratio, head/pronotum 1.4.

Apex of head process trifurcate, with transverse, waxy plates; triangular red area on midline behind apex (Fig. 106). Hind wings red at base, pale brown posteriorly. Tegmina brown mottled with yellow in large splotches, clavus predominantly yellow; transverse, yellowish fascia narrow, interrupted medially; diagonal yellow line from clavus to costal margin.

In coloration, the tegmen of *punctatus* most closely resembles *xanthopterus*, while the color of the head process resembles *ocellatus* and *minutacanthis*.

DISTRIBUTION.—Holotype (female): PANAMA: Bugaba. Paratype: El Volcan. I have seen two other specimens, one without data, the other collected from COSTA RICA: Palo Verde.

Phrictus quinquepartitus Distant

Fig. 104

Phrictus quinquepartitus Distant 1883:24, pl. 4, Fig. 8. Type repository: BMNH.

LENGTH.—Male 40–42 mm, female 45–48 mm; head length 9.3 mm; ratio, head/pronotum 2.06.

Apex of head process trifurcate, one median and three lateral pairs of waxy tufts in apex (Fig. 104). Hind wings red at base. Tegmina red with green veins; transverse, yellowish fascia bordered anteriorly in black.

This species is closely related to *tripartitus* in the color of the tegmen but differs in the apex of the head process.

DISTRIBUTION.—Syntypes: PANAMA: Bugaba, 3,000–4,000 ft; COLOMBIA: Bogota. I have seen nine other specimens collected in February, June, August, October and December from PANAMA: Barro Colorado Island, Cocle, Chiriqui; COSTA RICA: La Selva.

Phrictus regalis Caldwell

Fig. 105

Phrictus regalis Caldwell 1945:183, pl. 7, Figs. 7, 19, pl. 8, Fig. 8, pl. 10. Type repository: USNM.

LENGTH.—Male 42 mm, female 49–53 mm; head length 10; ratio, head/pronotum 2.3.

Apex of head process trifurcate, three waxy tufts on each side, two larger ones medially,

semicircular carinate area astride median carina (Fig. 105). Hind wings red at base. Tegmina mottled with red and brown in large splotches; transverse, yellowish fascia narrow, not bordered anteriorly in black.

This species is very similar to *diadema* in the color of the tegmen, but the apex of the head process is much wider in *regalis* (Figs. 105, 102).

DISTRIBUTION.—Holotype (female): FRENCH GUIANA: Maroni River, near Duserre. I have seen three other specimens collected in March from FRENCH GUIANA: St. Jean du Maroni; SURINAME: Nassaubeberge.

Phrictus tripartitus Metcalf

Figs. 103, 115b

Phrictus tripartitus Metcalf 1938:365, pls. 20, 21. Type repository: AMNH.

LENGTH.—Male 35–40 mm, female 43–45 mm; head length 9.4 mm; ratio, head/pronotum 1.8.

Apex of head process trifurcate, three round, waxy plates and one oval on each side (Fig. 103). Head process sinuate ventrally in lateral view (Fig. 115b). Hind wings red at base. Tegmina red with green veins; transverse, yellowish fascia bordered anteriorly in black.

This species most closely resembles *quinquepartitus* in the color of the tegmen, but the species may be separated by the shape of the apex of the head process. Some specimens of *tripartitus* do have five spines, but the intermediate spines are smaller than those of *quinquepartitus* (Fig. 104) and the shape of the other teeth is like that illustrated for *tripartitus* (Fig. 103).

DISTRIBUTION.—Type: BELIZE. I have seen 21 other specimens collected from August through October from BELIZE: 24 mi SE Belmopan, 10–11 mi S Georgeville; HONDURAS: La Ceiba; MEXICO: Nuevo X-Can [sic], San Quintin, Yucatan.

Phrictus xanthopterus Schmidt

Fig. 113

Phrictus xanthopterus Schmidt 1910:144. Type repository: IZN.

LENGTH.—Female 39–41 mm; head length 5 mm; ratio, head/pronotum 1.0.

Head process with apex trifurcate, without waxy plates, orange-red, with three triangular, black spots behind apex (Fig. 113). Hind

wings yellow at base with white spots in brown posterior area. Tegmen brown with yellow markings, half of clavus predominantly yellow; transverse, yellow fascia interrupted medially.

This species is one of the most distinctive with the hind wings yellow at base and with white spots in the apical brown area and the three black, subapical spots on the head process. The tegmen most closely resembles *punctatus*.

DISTRIBUTION.—Holotype (female): ECUADOR: Canelos. I have seen six other specimens collected in June and July and December from PERU: Cusco; Sta. Isabel; Route Olmoco-Tarapoto, km 385, 1,800 m; Tingo María; ECUADOR: Lumbagui.

Rhabdocephala Van Duzee

Fig. 23

Rhabdocephala Van Duzee 1929:190. Type-species: *R. brunnea* Van Duzee, original designation.

Small, brown, narrow insects, 12–16 mm long; head about 1/3 length of insect. Head process porrect, terete, sides parallel; apex slightly widened; dorsal lateral carinae complete, ventral incomplete, present only in middle of process. Preocular and supraocular flanges absent. Tegmen with M not pectinate, cross-veins reticulate, apical margin angled at apex of clavus, forming angulate, not smoothly rounded, apical margin. Ninth abdominal tergite 1.5 times length of eighth.

These small insects may be separated from other small Fulgoridae by the simple cephalic process with no dorsolateral undulate carinae as in *Scolopsella* and the head process not dorsoventrally flattened as in *Amycle*.

Rhabdocephala brunnea Van Duzee

Fig. 23

Rhabdocephala brunnea Van Duzee 1929:191. Type repository: CAS.

LENGTH.—Male 12–14 mm, female 14.5–16 mm; head 5.2 mm; ratio, head/pronotum 2.1.

Tegmen brown mottled with white. Hind wing red in basal third, brown posteriorly.

DISTRIBUTION.—Holotype (female): USA: Arizona. I have seen 15 other specimens collected from May to October from USA: ARIZONA: Pima, Cochise, and Santa Rita counties; MEXICO: Sonora, 15 mi S Hermosillo. Two

specimens were collected on *Baccharis sarothroides* Gray.

Scolopsella Ball

Figs. 8–13, 24–25

Scolopsella Ball 1905:118. Type-species: *S. reticulata* Ball by original designation.

Small, brown insects, 14–21 mm long, head .23–.28 length of insect. Head process porrect, terete, very slightly enlarged at apex; dorsolateral carinae undulate; median and lateral ventral and marginal carinae complete on process and frons. Preocular flange indistinct. Tegmen with M pectinate (3 branches), commissural margin emarginate between claval apex and wing tip.

This genus of small, brown insects may be separated from other similar genera by the straight head process with dorsolateral margins crenulate or undulate and without the apex greatly expanded. The head process is not as unadorned as *Rhabdocephala*, lacks the transverse wrinkles of *Aphrodisias*, and is not flattened as in *Amycle*. *Diareusa* specimens are much larger insects with much shorter heads.

Key to the Species of *Scolopsella*

1. Length of anal flap of male greater than width at apical expansion (Fig. 23); apical margin of pygofer emarginate ventrally (Fig. 25) *reticulata* Ball
- Length of anal flap of male less than width at apical expansion (Fig. 20); apical margin of pygofer smoothly convex (Fig. 22) *mexicana* O'Brien

Scolopsella mexicana O'Brien

Figs. 8–10, 24

Scolopsella mexicana O'Brien 1985:73. Type repository: LOB.

LENGTH.—Male 14–15 mm, female 17–21 mm; head length 5.6 mm; ratio, head/pronotum 3.7.

Tegmen various shades of brown, cross-veins and reticulations pale, some apical cells white. Structural characteristics common to both species given in generic description.

Scolopsella reticulata and *S. mexicana* may be separated by the shape of the anal flap, which can be seen without dissection, the applicable characters being given in the key. Once males are identified in this way, females may often be associated with them because the golden brown *reticulata* is slightly larger

and the head process is wider, and *mexicana* is darker.

DISTRIBUTION.—Type: MEXICO. I have seen seven other specimens collected from June through September from Baja California.

Scolopsella reticulata Ball
Figs. 11–13, 25

Scolopsella reticulata Ball 1905:118. Type repository: CAS.

LENGTH.—Male 14–16 mm, female 17–19 mm; head length 5 mm; ratio, head/pronotum 4.1.

The structural characters and coloration do not differ sufficiently from *S. mexicana* to determine the species without either using the shape of the male anal flap or comparing the two species as discussed above.

DISTRIBUTION.—Holotype: ARIZONA. I have seen other specimens collected from April to November in ARIZONA: Maricopa, Pima, Pinal, and Santa Cruz counties; CALIFORNIA: Joshua Tree National Monument, Riverside or San Bernardino County.

Sinuala, n. gen.
Figs. 43, 46–48

Type-species: *Sinuala stali* O'Brien.

Reddish brown, medium-sized insects, 19–21 mm long, head .12 to .15 length of insect. Head process porrect, terete, enlarged at apex; vertex truncated triangle, basal angle rounded, supraocular lobes variable. Frons with lateral carinae diverging anteriorly to form process; lateral margins expanded near frontoclypeal suture, ridge from lateral carina to margin at this expanded area. Frons and clypeus about in same plane, frons not raised above clypeus; clypeus medially and marginally carinate. Preocular flange lengthened into pleural carina. Pronotum without raised median carina, lateral fossettes and two pleural carinae present; apex of mesonotum with striate triangle, delimited by carinae, not high ridge. Tegmen with M not pectinate, clavus open, longitudinal veins angulate, cross-veins variable. Fore and mid femora expanded. Posterior tibiae with eight lateral spines. Female abdominal tergite nine twice length of eight.

This genus is similar to *Aphrodisias*, from which it differs by the costal margin of the

tegmen sinuate and the head process not transversely ridged.

Key to the Species of *Sinuala*

- 1. Supraocular flange expanded, height equal to width of eye; tegmen with 10 strong tubercles *tuberculata*, n. sp.
- Supraocular flange smaller than above; tegmen with tubercles evanescent 2
- 2(1). Vertex as long as broad (Fig. 46); hind wing red at base *stali*, n. sp.
- Vertex 1.7 times longer than broad (Fig. 48); hind wing pink at base *schmidti*, n. sp.

Sinuala stali, n. sp.
Fig. 46

LENGTH.—Male 19–20 mm; head 2.3 mm; ratio, head/pronotum 1.4.

Head process short, vertex as long as broad. Hind wing red at base, narrow anterior margin and broad posterior area brown, apical angle brown with some white spots and crossveins.

This species may be easily separated from *tuberculata*, which it resembles in wing color and head length, by the small, supraocular flange of *stali*. I name this species in honor of Carl Stål, who provided a fine basis for generic work in this family.

HOLOTYPE (male).—HONDURAS: Lago Yojoa, 6-VI-1976, J. V. Mankins, coll. (LOB). Paratype (male): EL SALVADOR: Alfredo Martinez Cuestas, no further data (NCSR).

Sinuala schmidti, n. sp.
Fig. 47

LENGTH.—Female 21.5 mm; head 3.3 mm; ratio, head/pronotum 2.2.

Head process elongate, vertex 1.7 times as long as broad. Hind wing pink at base, then white; anal margin pale brown, posterior margin with cells infusate, veins white; apical third brown with white lines following each cross-vein.

This species may be separated from the others by the long head and the pale base of the hind wings. I name this species in honor of Edmund Schmidt, who had an excellent eye for species and a gift for describing the most significant characters precisely.

HOLOTYPE (female): BELIZE: Corozal, 1 mi NW Corozal, 12-VIII-1977. C. W. and L. B. O'Brien and Marshall (LOB).

Sinuala tuberculata, n. sp.
Figs. 43, 48

LENGTH.—Female 21 mm; head 2.6 mm; ratio, head/pronotum 1.6.

Head process short, vertex with postocular flange raised above vertex equal to width of eye, vertex as long as broad. Hind wing red in basal half, anal area brown, apical 2/5 brown with some white spots and cross-veins. Five strong tuberculations on veins in anterior half of tegmen, five smaller in apical half.

This species may be separated easily from the others by the strong tubercles on the tegmen and the strong supraocular flange.

HOLOTYPE (female): COSTA RICA: P. R. Uhler Colln. (NCSR).

Stalubra, n. gen.

Figs. 1–3, 5, 6

Type-species: *Stalubra brunnea* O'Brien.

Medium-sized, brown or reddish, transparent-winged insects, 19–28 mm long, head .14 to .19 length of insect. Head process terete, gradually narrowing to apex, upturned at apex. Vertex twice as long as broad, elongate medially (Fig. 1). Lateral carinae of frons parallel or diverging toward head process, median carina on process and basal 2/3 of frons; frons only very slightly raised above frontoclypeal suture; lateral margins of frons expanded near apex; weak ridge from lateral carina to lateral margins. Clypeus laterally carinate. Preocular flange reduced to slight tubercle on vertical carina joining marginal carinae of frons and vertex (Fig. 3). Pronotum without median carina raised, fossettes and two pleural carinae present; mesonotal apex not depressed or striate. Tegmen with M pectinate (5–7 branches); clavus open; cross-veins undulate, parallel; no small spines on veins, only on wing margins. Posterior tibiae with six lateral spines. Female abdominal tergite nine shorter than eight.

This genus is similar to *Enhydria* in the compressed, recurved head process and translucent tegmen; however, it lacks the hairs on the veins of the tegmen and the dense, diagonal cross-veins along the costal margin found in *Enhydria*, and the head process is less strongly curved. It differs from *Chilobia* in the vertex being elongate medially, whereas the vertex in *Chilobia* is broader than long and emarginate medially (Figs. 51, 54, 60) or hidden by the recurved head process (Fig. 57).

Lallemand's species *Enhydria rufula* (1966) belongs in this genus, but I cannot tell from his description which it is of two of the three species I have before me. The requested type has not yet arrived, and so these two species will be discussed in Part II.

Stalubra brunnea, n. sp.

Figs. 1–3, 5, 6

LENGTH.—Male 19–22 mm; head 2.6 mm; ratio, head/pronotum 1.9.

Head short, vertex 1.5 times as long as wide. Hind wing clear with brown veins. Tegmen translucent with brown markings and minute red dots along veins, apex pale brown with white circles plus some darker brown spots.

HOLOTYPE (male).—BRASIL [sic]: Mato Grosso, Sinop (12°31'S, 55°37'W), X-1975, M. Alvarenga (LOB). Paratypes (25 male): same data (LOB, MZSP); GUYANA: 1 male, Upper Mazaruni River, IX–X-1938, A. S. Pinkus (AMNH).

ACKNOWLEDGMENTS

It is with great pleasure that I dedicate this paper to our Latin American colleagues and to Paul Oman, among whose many accomplishments is a paper on a U.S. fulgorid (Oman 1936).

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Natural History, Chicago, Illinois; FSAG—Faculte des Sciences Agronomiques, Gembloux, Belgium; IZW—Instytut Zoologii PAN, Warsaw, Poland; LOB—Lois O'Brien collection, Tallahassee, Florida; MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MHNP—Museum National d'Histoire Naturelle, Paris, France; MRSN—Museo Regionale di Scienze Naturali, Turin, Italy; MZF—Museo Zoologico dell'Universita degli Studie di Firenze, Florence, Italy; MZSP—Muzeu de Zoologia, Universidade de Sao Paulo, Brazil; NCSU—North Carolina State University, Raleigh; NHMV—Naturhistorisches Museum, Vienna, Austria; NRS—Naturhistoriska Riksmuseet, Stockholm, Sweden; OSU—Ohio State University, Columbus; UCB—University of California, Berkeley; UMO—University Museum, Oxford University, Oxford, England; UNAM—Instituto de Biologia and Museo de Zoologia, Universidad Nacional Autonoma de Mexico, Mexico City, D.F.; USNM—United States National Museum, Washington, D.C.; UZIL—Universitets Zoologiska Institut, Lund, Sweden; UZIU—Universitets Zoologiska Institut, Uppsala, Sweden; ZMHB—Zoologisches Museum, Humboldt Universitat, East Berlin, East Germany; ZMUC—Zoologisk Museum, Universitets Copenhagen, Denmark; ZSBS—Zoologische Sammlungen des Bayerischen Staates, Munich, East Germany.

LITERATURE ON NEW WORLD FULGORIDAE SINCE METCALF'S CATALOG

(A complete bibliography will be included with the final part.)

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LIST OF SPECIES

(Countries are listed from south to north, west before east.)

- Amerzanna* O'Brien, new genus
peruana O'Brien Peru
- Amycle* Stål
anabilis (Westwood) Mexico
brevis O'Brien Mexico
grandis O'Brien Mexico
mankinsi O'Brien Honduras
pinyonae Knoll & Knoll USA: CA, AZ, NM
saxatilis Van Duzee USA: CA
sodalis Stål Mexico, El Salvador
tumacacoriae Knoll & Knoll USA: TX, AZ
vernalis Manee USA: NC, LA
- Aphrodisias* Kirkaldy
cacica (Stål) Mexico
shaman O'Brien Mexico
- Artacie* Stål
dufourii (Signoret), resurrected name Fr. Guiana, Guyana
haemoptera (Perty) Brazil
- Cathedra* Kirkaldy
serrata (Fabricius) Bolivia, Peru, Brazil, Fr. Guiana, Suriname, Colombia, Panama, Costa Rica
- Chilobia* Stål
 = *Ecuadoria* Distant, new synonymy
cinxia Stål Venezuela
dichopteroides (Distant), (*Ecuadoria*), new combination Ecuador
silena Stål Ecuador
smaragdina (Walker) Venezuela
- Copidocephala* Stål
guttata (White) Panama, Costa Rica, Guatemala, Mexico
merula Distant Colombia
 = *melanoptera* (Schmidt), new synonymy
viridiguttata Stål Columbia, Panama, Costa Rica, Honduras, Mexico
 = *ornanda* (Distant), new synonymy
- Diareusa* Walker
annularis (Olivier) Peru, Brazil, Fr. Guiana, Suriname, Guyana
conspersa Schmidt Ecuador, Colombia
 = *dahli* Ossiannilsson, new synonymy

- imitatrix* Ossiannilsson Venezuela, Panama, Costa Rica, Belize, Mexico
kemmeri Ossiannilsson Peru
Ecuadoria, see *Chilobia*
Enchophora Spinola
atomaria Brancsik, see *Cornelia*, teste Lallemand 1959:88
dufourii Signoret, see *Artacie*, teste O'Brien 1985:661
ensifera (Germar), to incertae sedis
maculata O'Brien Peru
nigromaculata Distant Bolivia, Peru, Ecuador, Brazil
 = *nigrolimbata* Lallemand
pallidipunctata Lallemand Bolivia, Peru
prasina Gerstaecker Bolivia, Peru, Panama, Costa Rica
pyrrhocrypta Walker Brazil, Guyana, Venezuela
recurva (Olivier) Suriname, Brazil
 = *bohemani* Stål, new synonymy
rosacea Distant Panama, Costa Rica, Nicaragua
sanguinea Distant Ecuador, Colombia, Panama, Costa Rica, Nicaragua, Guatemala
 = *florens* Distant, new synonymy
 = *longirostris* Distant, new synonymy
stillifera (Stål) Panama, Costa Rica, Honduras, Guyana, Belize, Mexico
subviridis Distant Panama, Costa Rica
 = *subviridis* var. *distanti* Metcalf
tuba (Germar) Brazil
tuberculata (Olivier) Brazil, Fr. Guiana, Suriname, Venezuela
 = *tuberculata* var. *fuscomaculata* Lallemand
 = *parvipennis* Walker, new synonymy
uniformis O'Brien Peru
viridipennis Spinola Brazil
 = *eminenta* Schmidt, new synonymy
- Enhydria* Walker
 = *Ulubra* Stål, new synonymy
cicadina Gerstaecker Brazil
ferruginea (Walker) to *Hydriena* (Dictyophariidae)
longicornuta Lallemand Brazil, Trinidad
tessellata (Walker) Peru, Brazil
 = *brachialis* (Stål), new synonymy
- Fulgora* L. (New synonymies in this genus are attributed to B. V. Ridout)
caerulescens Olivier, to incertae sedis
castresii Guerin-Meneville Peru, Panama, Mexico
cearensis (Fonseca) Brazil, Trinidad
crocodilia Brailovsky & Beutelspacher Mexico
graciliceps Blanchard Peru, Bolivia, Brazil
 = *orthocephala* (Fonseca), new synonymy, Ridout
lampetis Burmeister Bolivia, Peru, Brazil, Panama, Costa Rica, Nicaragua, Honduras
laternaria (Linne) Brazil, Panama, Honduras, Mexico
 = *servillei* Spinola, new synonymy, Ridout
lucifera Germar Argentina, Bolivia, Brazil
riograndensis (Fonseca) Brazil
- Odontoptera* Carreno
carrenoi Signoret Brazil, Fr. Guiana, Guyana, Panama, Costa Rica, Guatemala, Mexico
spectabilis Carreno Brazil
- Phrictus* Spinola
auromaculatus Distant Bolivia, Peru, Ecuador, Brazil

= <i>notatus</i> Lallemand, new synonymy		<i>tripartitus</i> Metcalf	Panama, Honduras, Belize
<i>delicatus</i> O'Brien	Brazil	<i>xanthopterus</i> Schmidt	Peru, Ecuador
<i>diadema</i> (Linnaeus)	Brazil, Fr. Guiana, Suriname	<i>Rhabdocephala</i> Van Duzee	
= <i>diadema</i> var. <i>walkeri</i> Metcalf		<i>brunnea</i> Van Duzee	USA: AZ, Mexico
<i>diligens</i> O'Brien	Colombia	<i>Scolopsella</i> Ball	
<i>hoffmannsi</i> Schmidt	Peru, Ecuador	<i>mexicana</i> O'Brien	Mexico
<i>minutacanthis</i> Caldwell	Peru	<i>reticulata</i> Ball	USA: AZ, CA
<i>moebiusi</i> Schmidt	Colombia	<i>Sinuata</i> O'Brien, new genus	
= <i>sordidus</i> Caldwell, new synonymy		<i>schmidti</i> O'Brien	Belize
<i>ocellatus</i> Signoret	Venezuela, Colombia	<i>stali</i> O'Brien	Honduras, El Salvador
<i>punctatus</i> Caldwell	Panama	<i>tuberculata</i> O'Brien	Costa Rica
<i>quinquepartitus</i> Distant	Colombia, Panama, Costa Rica	<i>Stalubra</i> O'Brien, new genus	
		<i>brunnea</i> O'Brien	Brazil, Guyana
<i>regalis</i> Caldwell	Fr. Guiana, Suriname	<i>rufula</i> (Lallemand), (<i>Enhydria</i>), new combination	Brazil